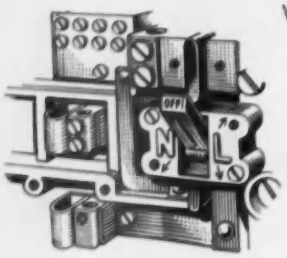
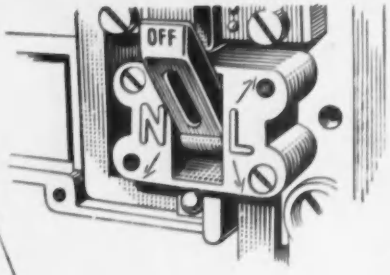
3 NOVEMBER 1955

ONE SHILLING

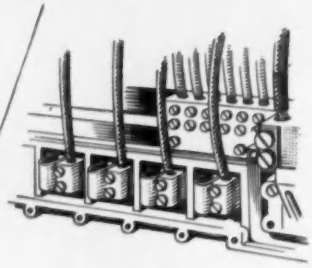
ELECTRICAL TIMES



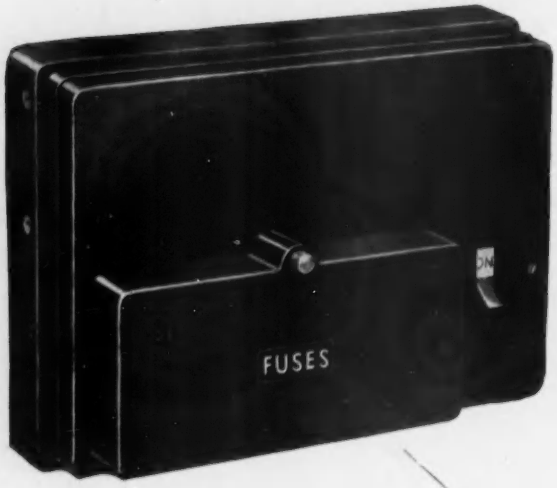
Solid permanent connections link busbar and neutral bar to the Switch.

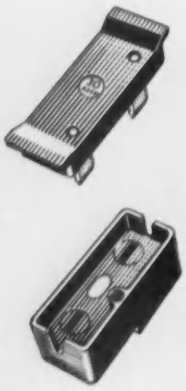


60 amp Switch—the famous original Wylex Slow-break Switch.

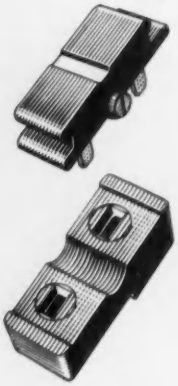


Easy wiring facilities — no awkward corners nor blind wiring.





Fuse Bridges and Contact Shields for rewirable fuses. Not "just a fuse" but a carefully engineered component.



Fuse Holders and Contact Shields for H.R.C. Cartridge Fuses.

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"Sems"—another device for easy re-fusing. Washers rise with the screw.

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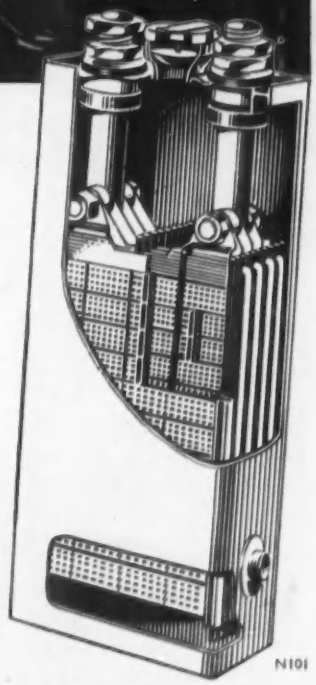
Which battery is built like a Centurion Tank?



Answer—a Nife! It too is made of steel and like the Centurion Tank is built to stand up to the toughest use—to withstand shock and vibration and to operate efficiently under the severest mechanical conditions. In direct contrast to the Centurion Tank, however, a Nife Battery is small and compact, takes up very little space and requires virtually no maintenance. Also a Nife withstands the heaviest discharge, is free from self-discharge and is unaffected by idleness in any state of charge. *It repays its original cost many times over!*

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NEW TWO-WAY RADIO EQUIPMENT

Demonstrations of a new equipment, designed in Cambridge, have been given in London recently to representatives of Police and Fire Services, Local Authorities and Industrial Organisations. This equipment has been designed to defeat the chronic shortage of two-way radio channels.

Known as the Pye "Ranger" it is the solution to the frequency shortage which is hamstringing mobile radio users in Great Britain!

The new equipment operates on a channel spacing of only 25Kc/s—a quarter of the customary spacing—thus potentially quadrupling the number of mobile radio channels. Robust construction, excellent performance and carefully selected components make it capable of operating under arduous conditions and in any weather.

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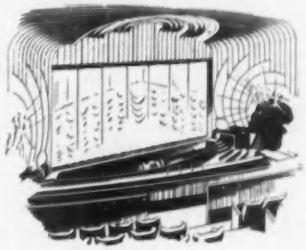
Number three in a series

BTH have played a major role in the development of electronic engineering. Nearly 50 years ago research work was already under way at the Rugby Works. The work of those early days led to the design and manufacture during the first Great War of thermionic valves for military equipment. Since then, BTH electronic equipment has occupied a leading position and earned for itself an outstanding reputation for reliability. Twenty years after their original installation, many BTH electronic installations are still in active, daily use. There could be no greater tribute than this to the design and reliability of BTH industrial electronic equipment.

The same skill, resourcefulness and care that went into these pioneer installations is at your disposal today. If you have a problem involving electronics, the assistance and advice of BTH engineers are available to you at all times.



Control of cinema lighting circuits in the Odeon, Leicester Square, is effected by BTH Thyratron reactor controls. Installed sixteen years ago, this equipment has given outstanding service, with extremely good valve life, and is in continual use. The equipment controls 66 lighting circuits of varying ratings up to 3 kW. Fifty-two circuits are for stage lighting and fourteen for house lighting. Stage and house circuits may be controlled from a control board in the stage wings, or, when a show is in progress, the house circuits can be operated from the projection box. The 66 circuits involve the use of 132 thyratrons and 66 rectifier valves.

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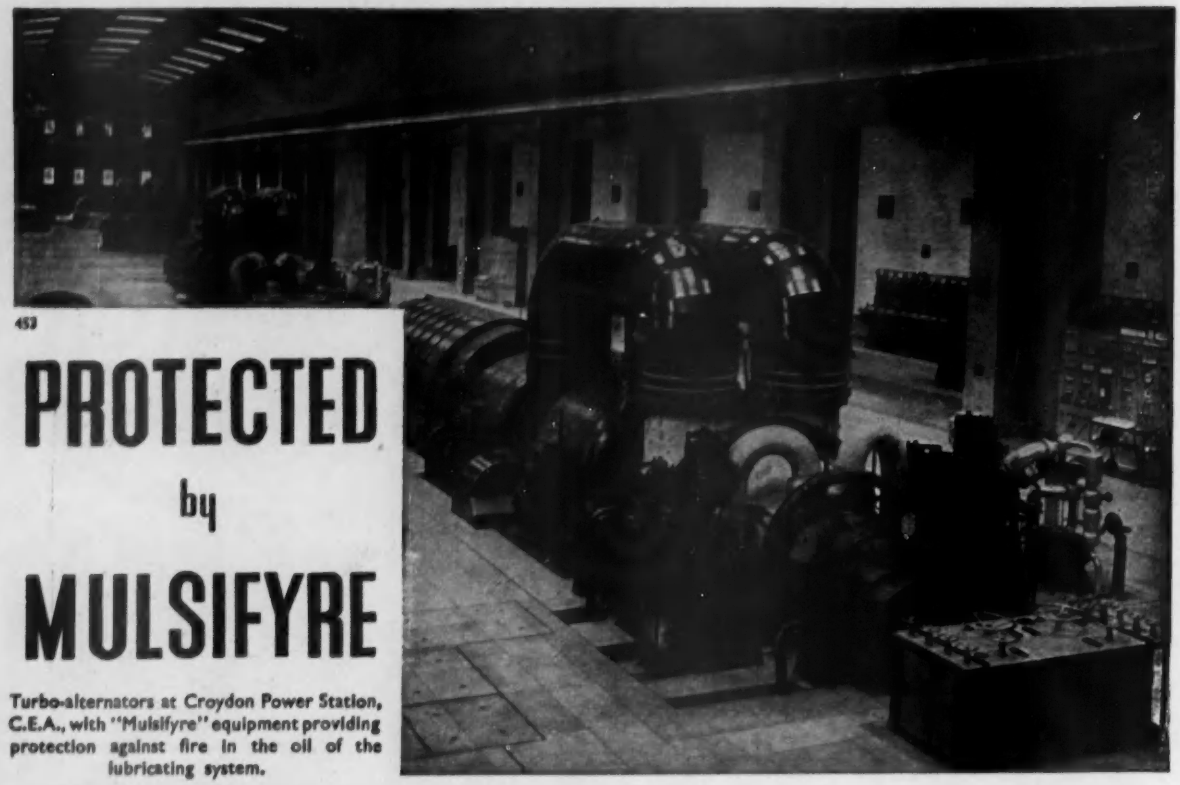

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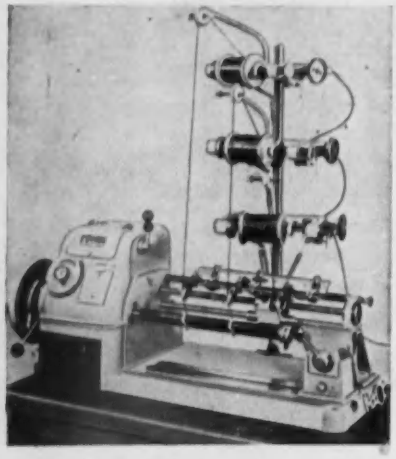

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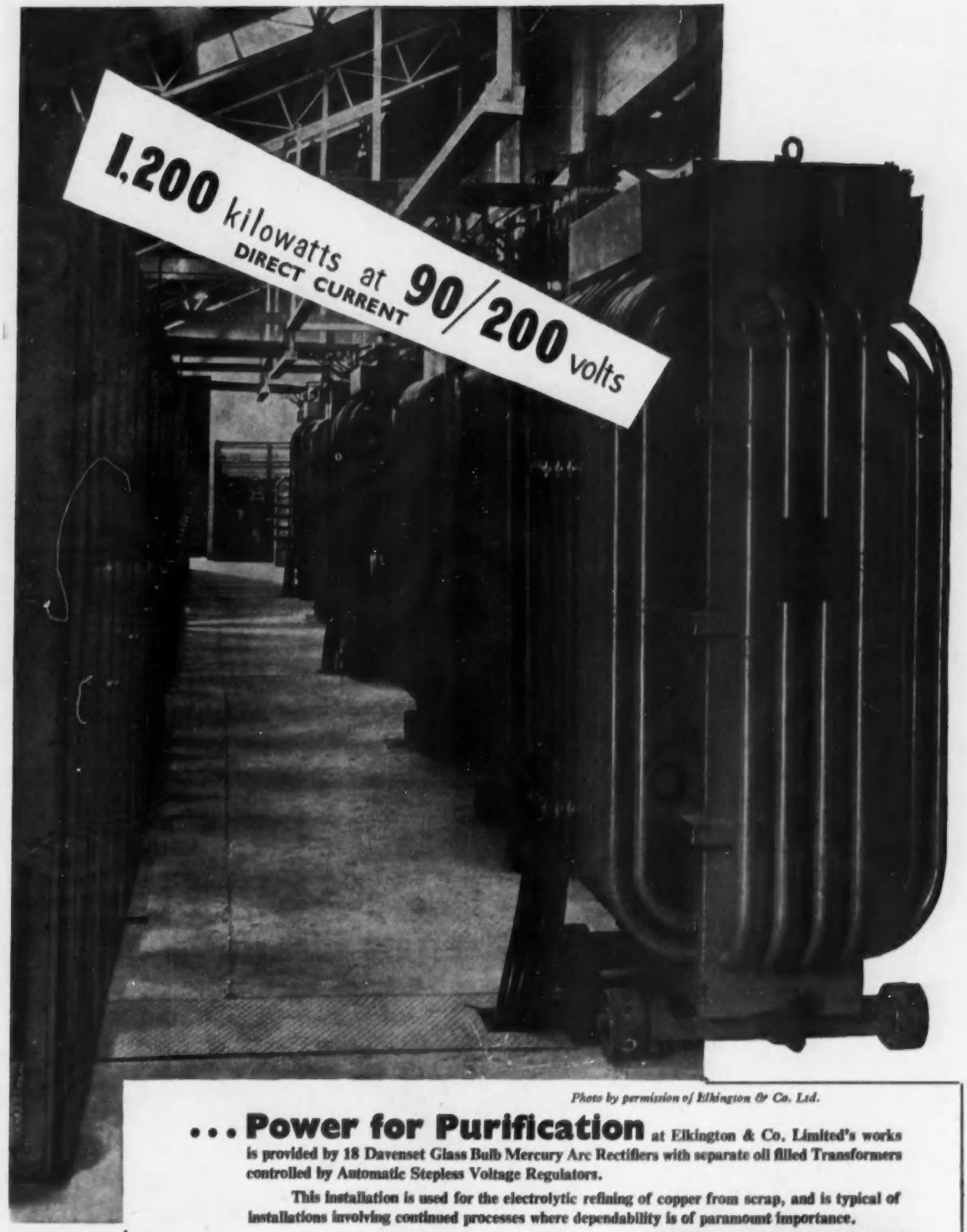

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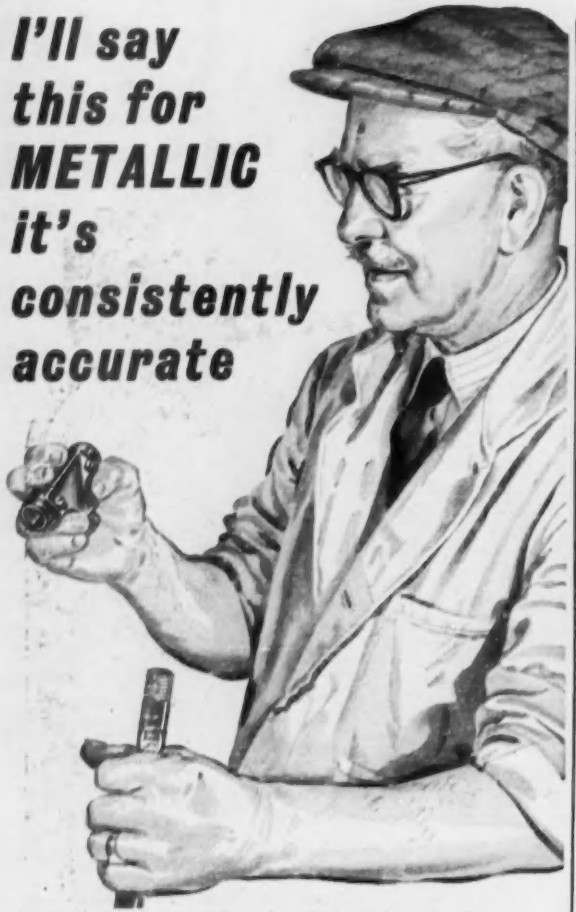

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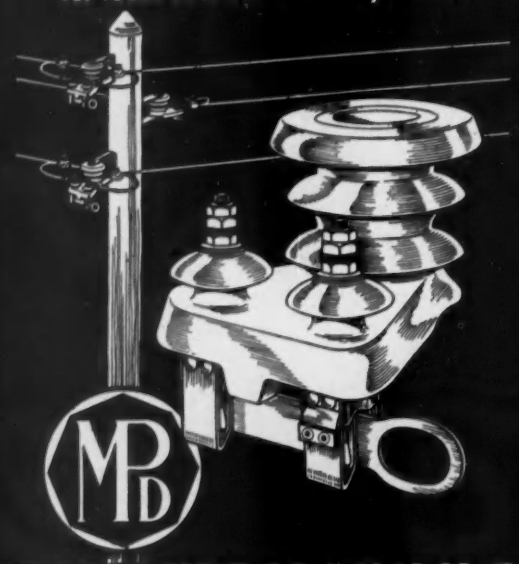

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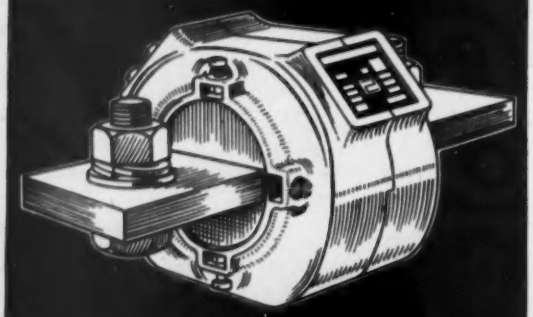

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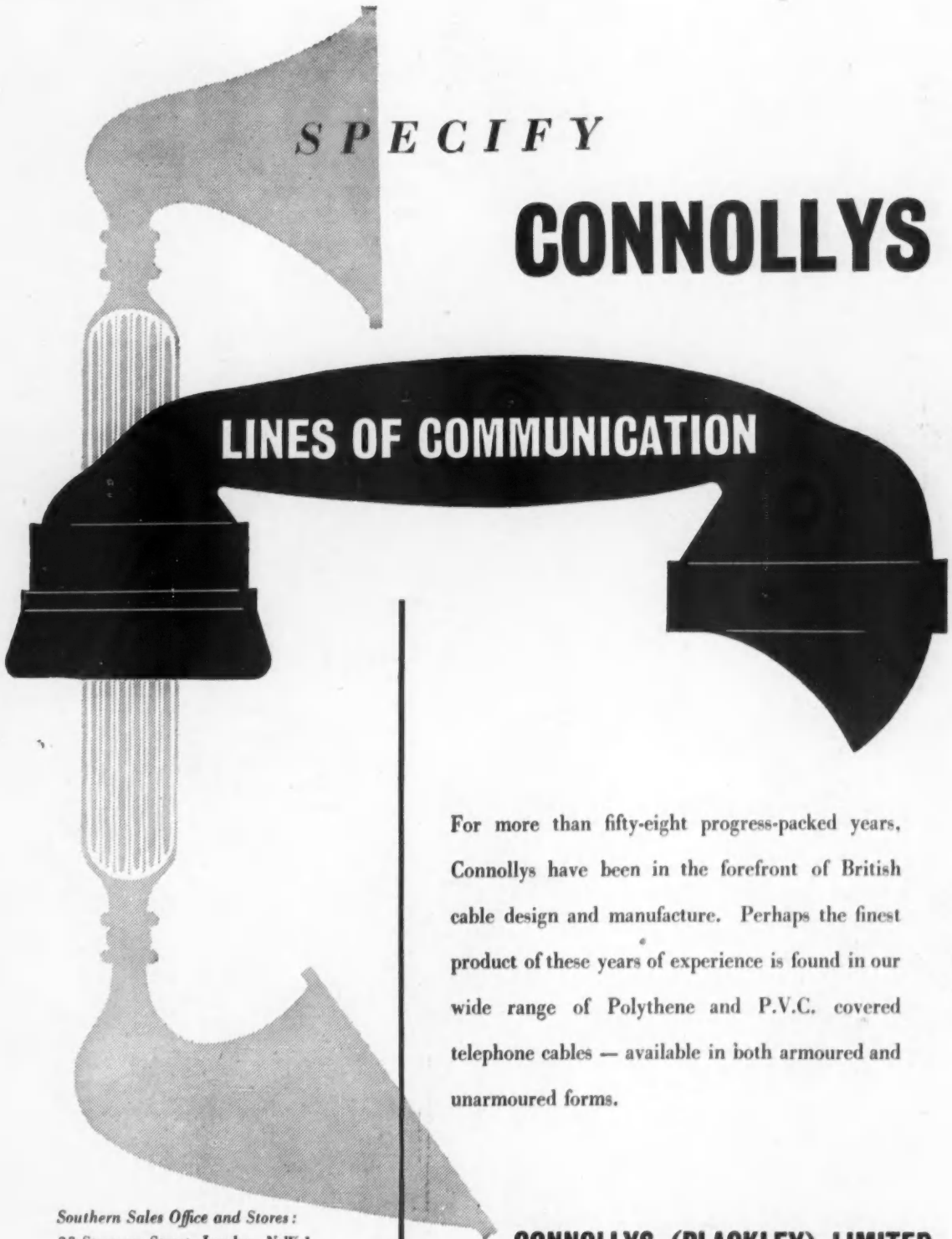

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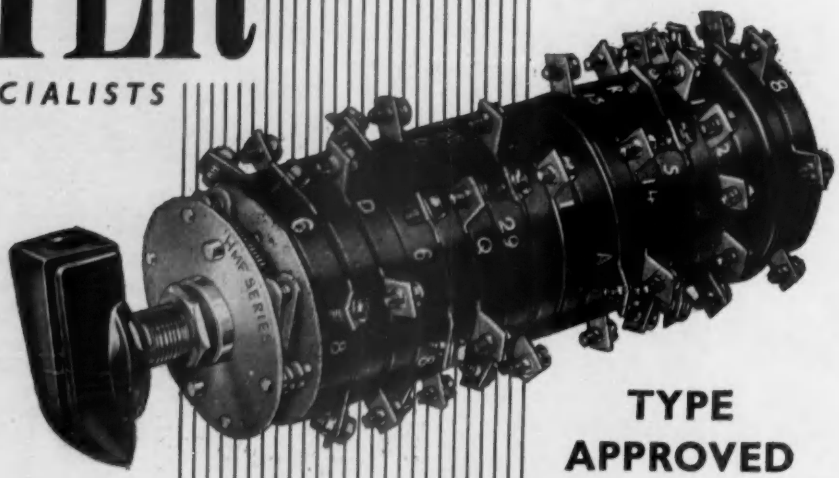

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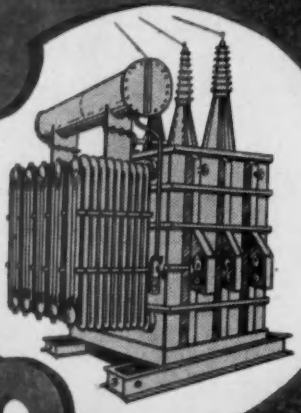

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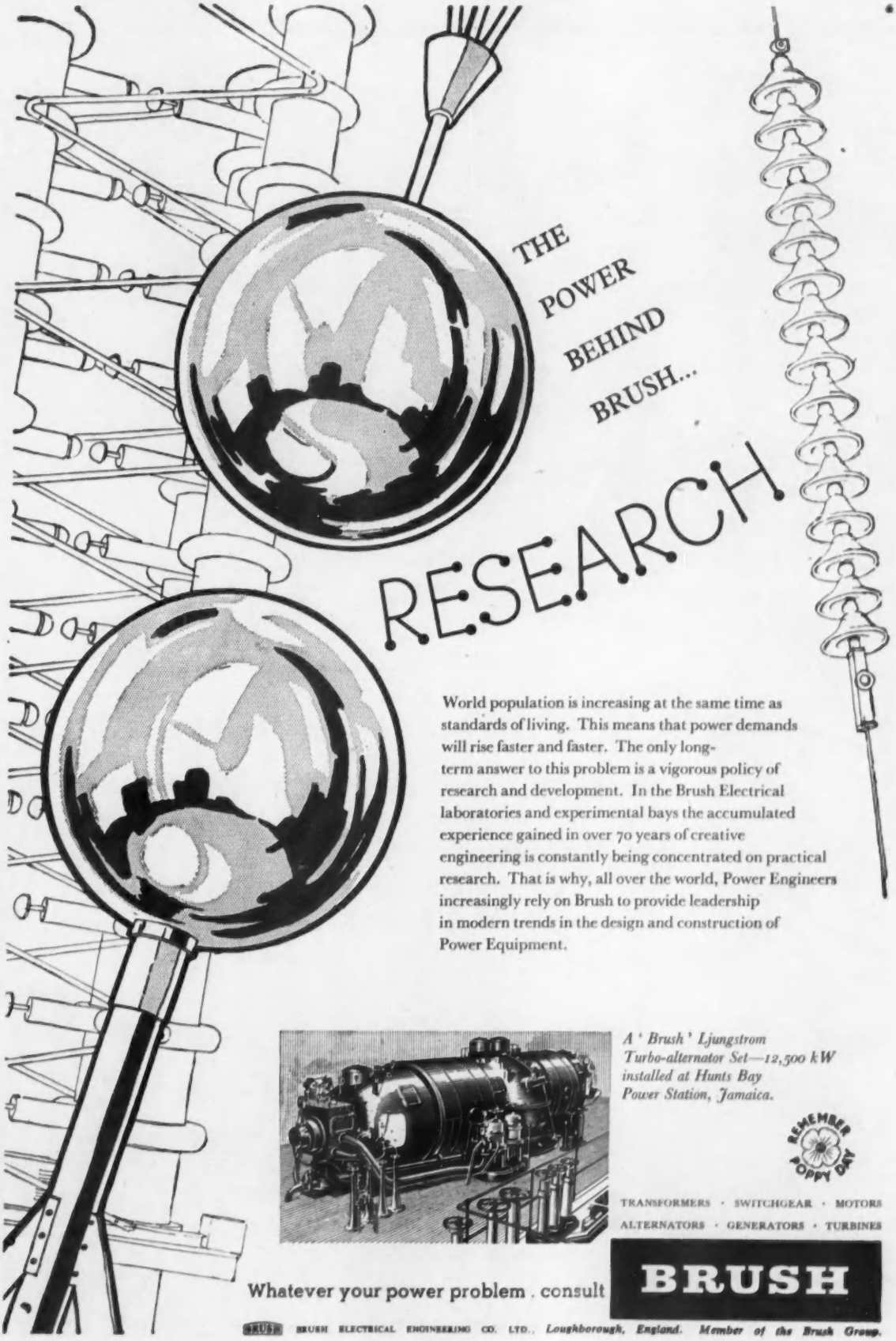

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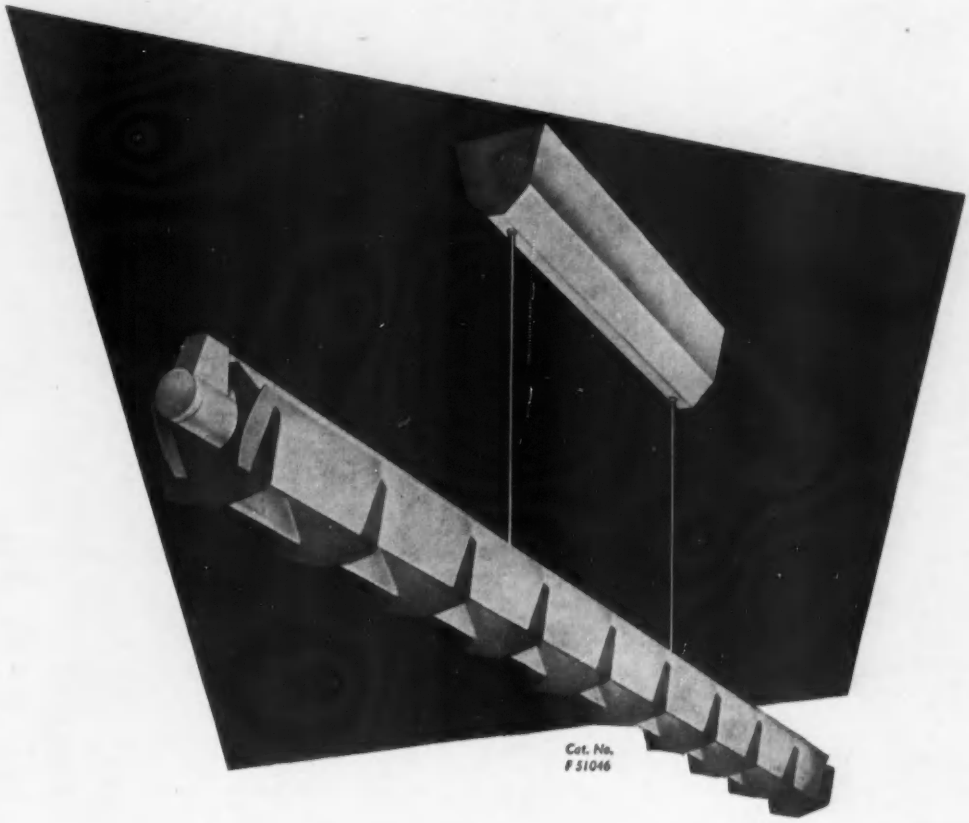

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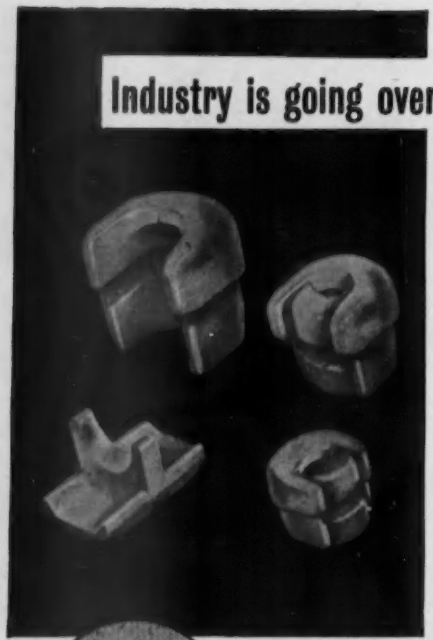

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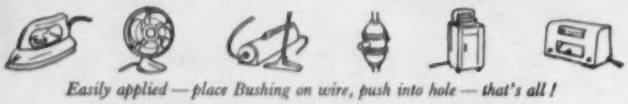

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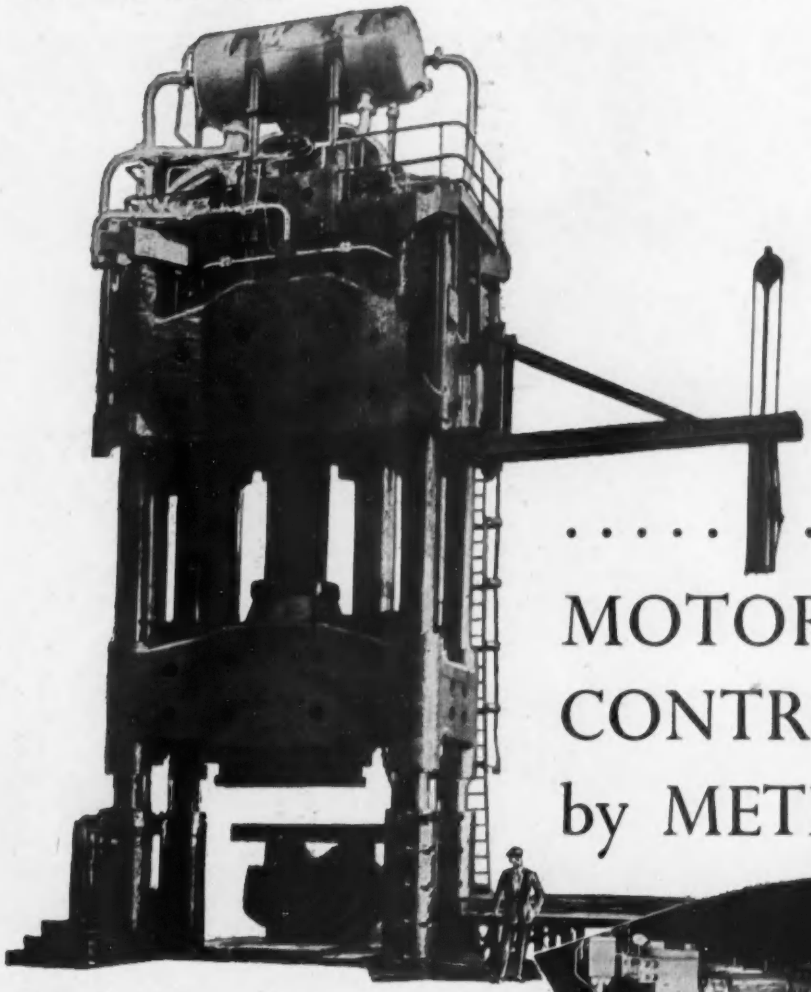
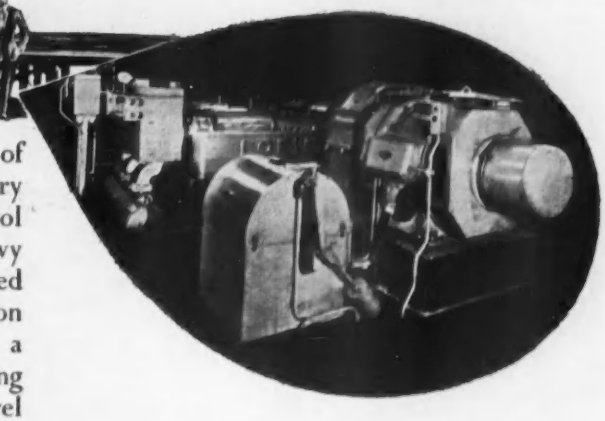


.....with MOTORS and CONTROL GEAR by METROVICK



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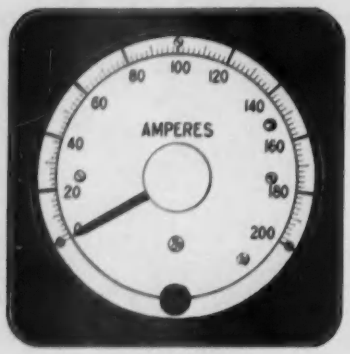

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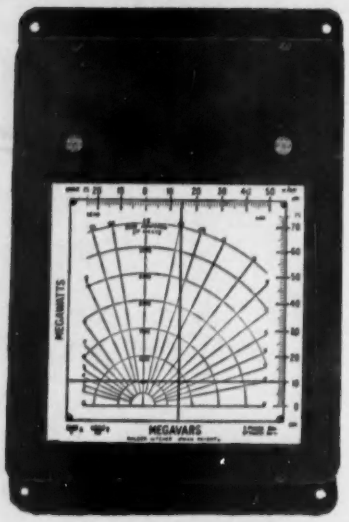

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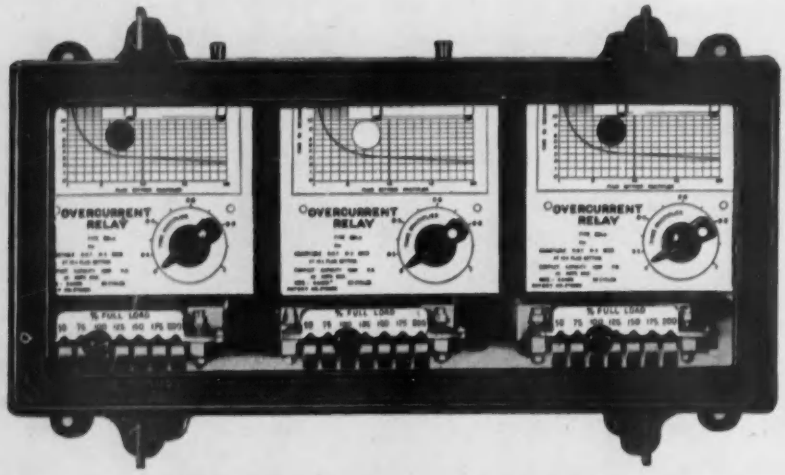

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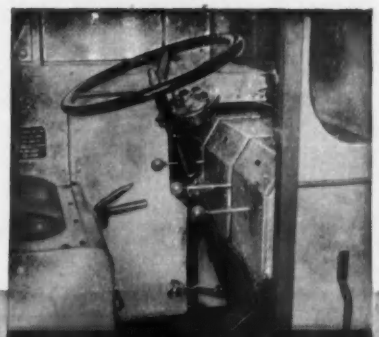

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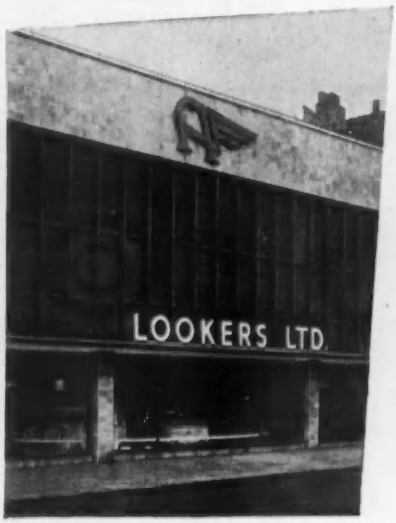

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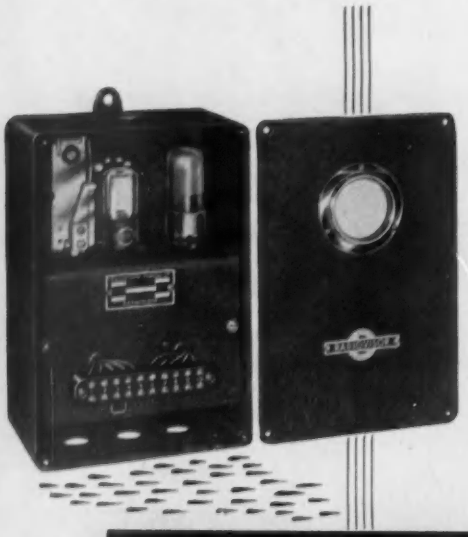

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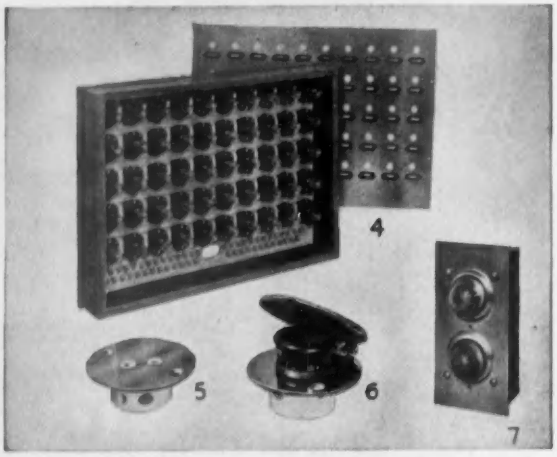

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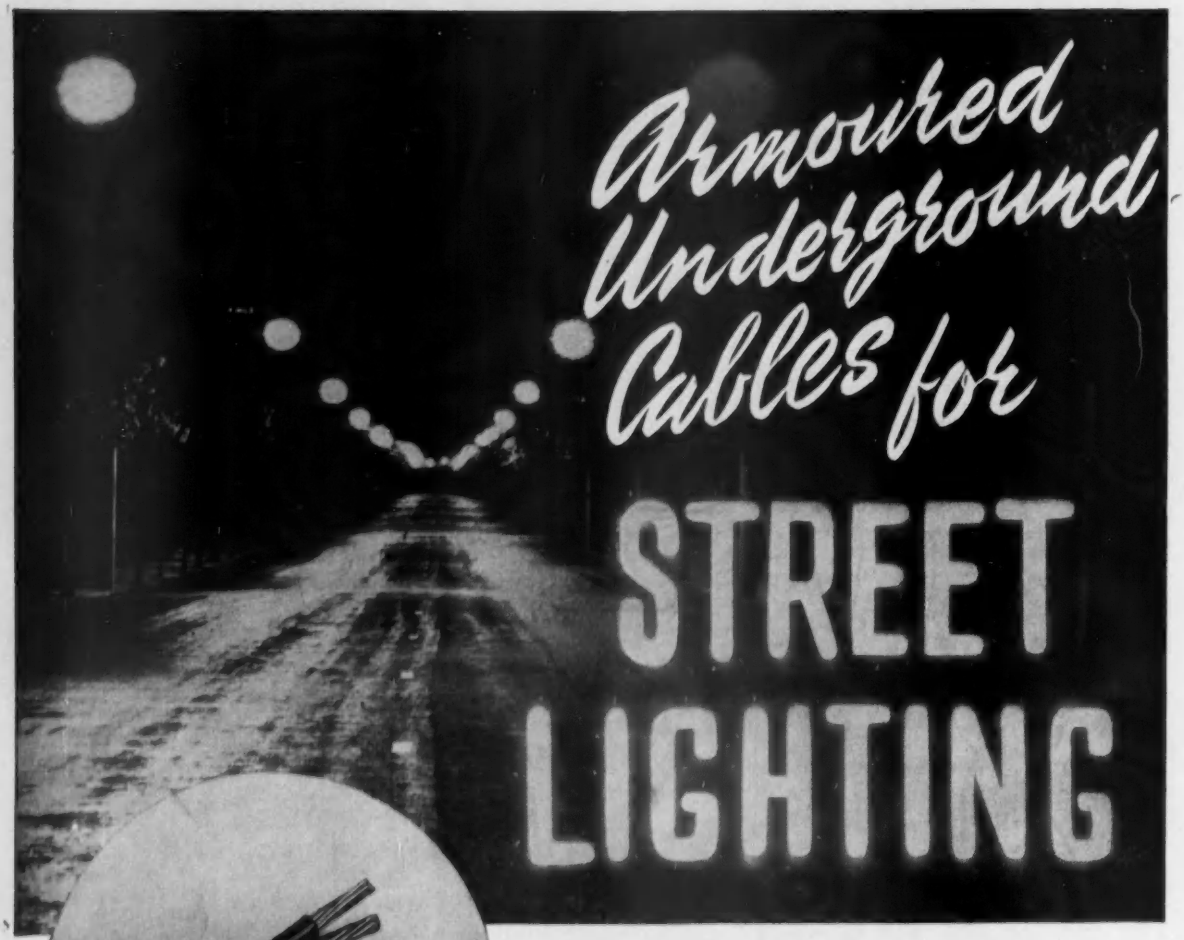

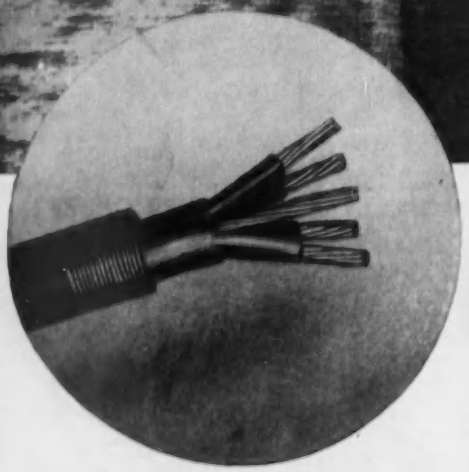

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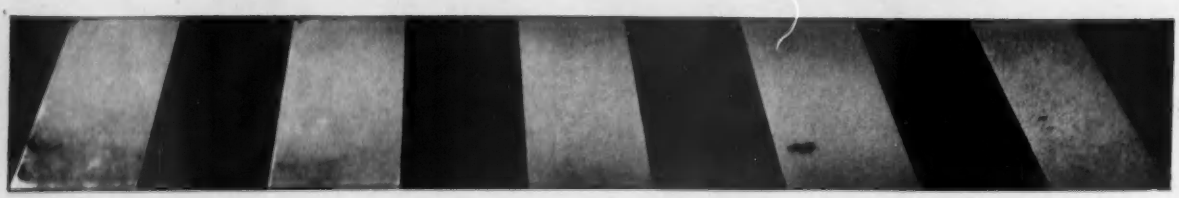

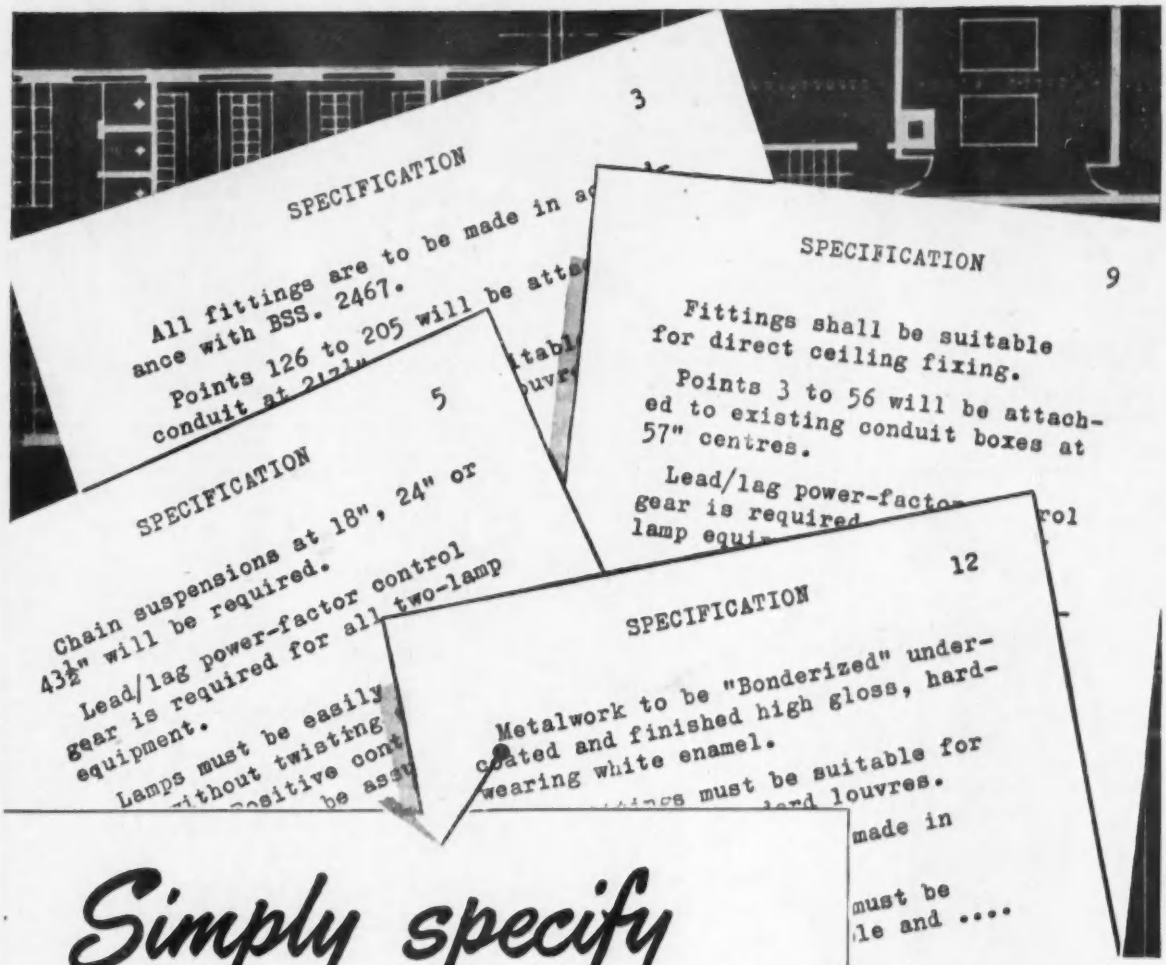

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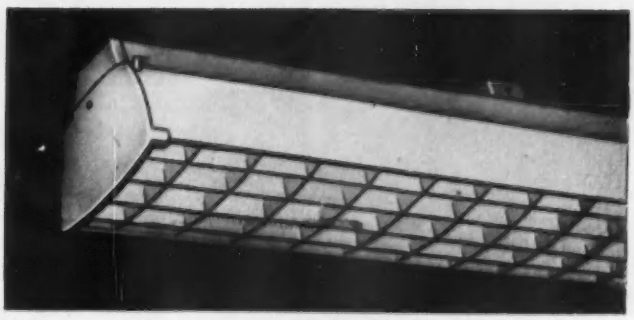

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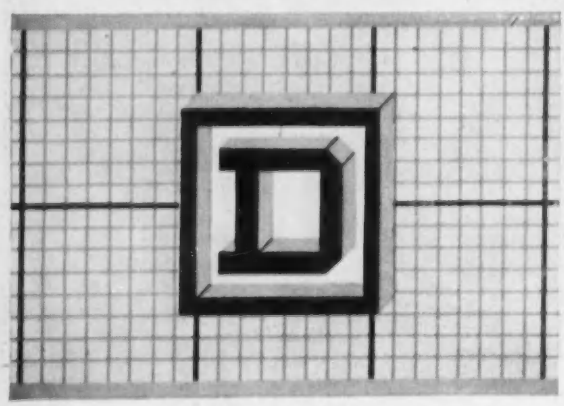

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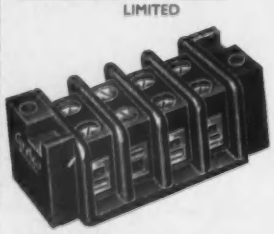

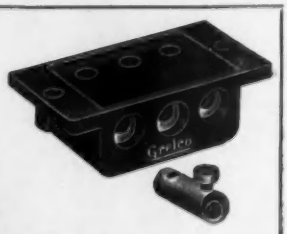

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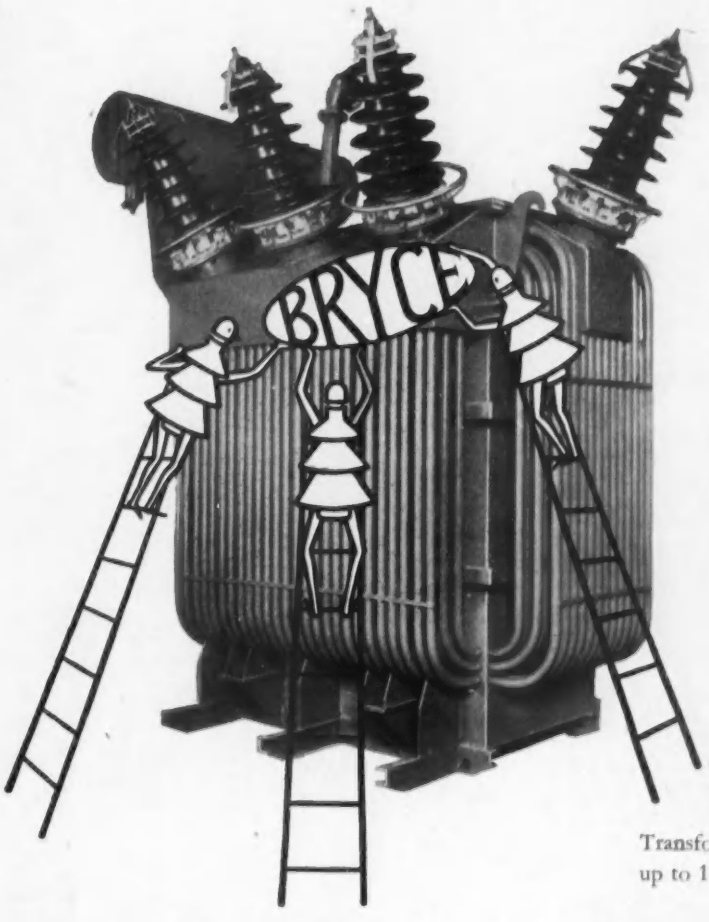

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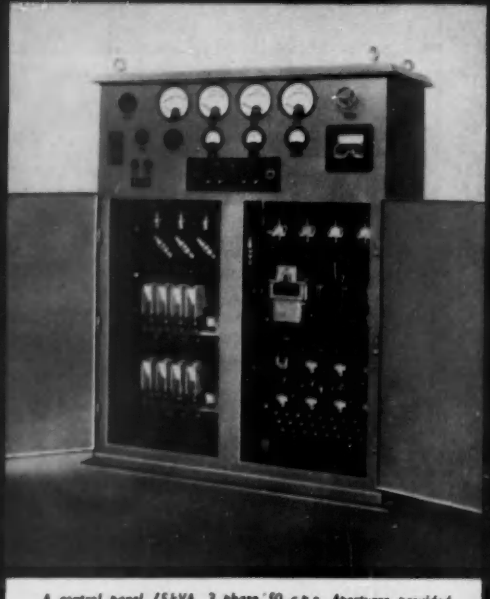

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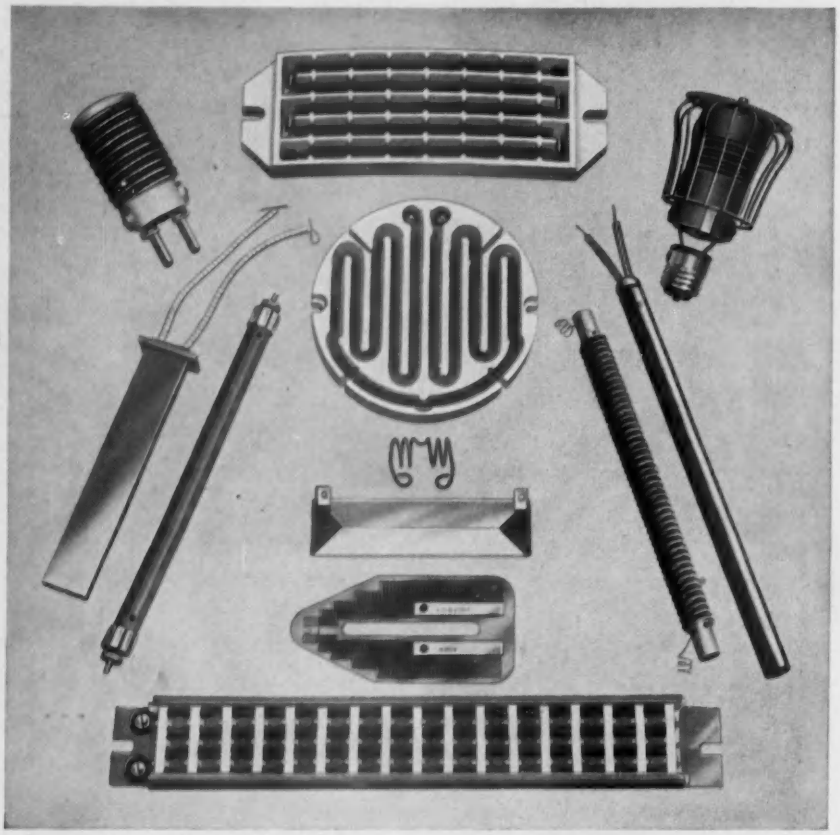

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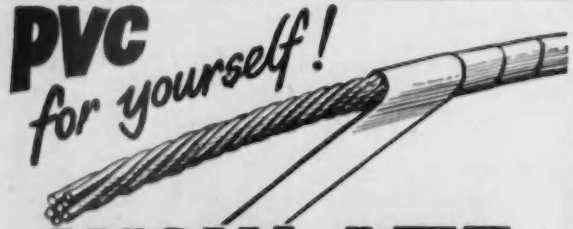

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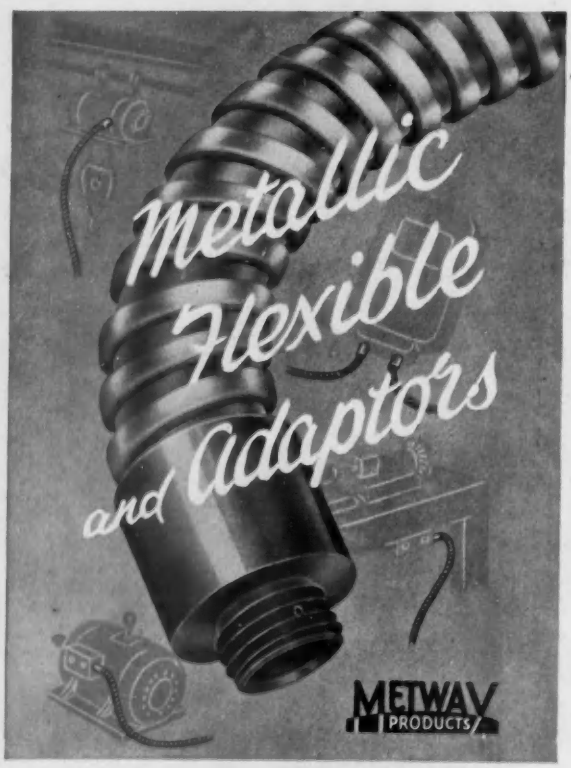

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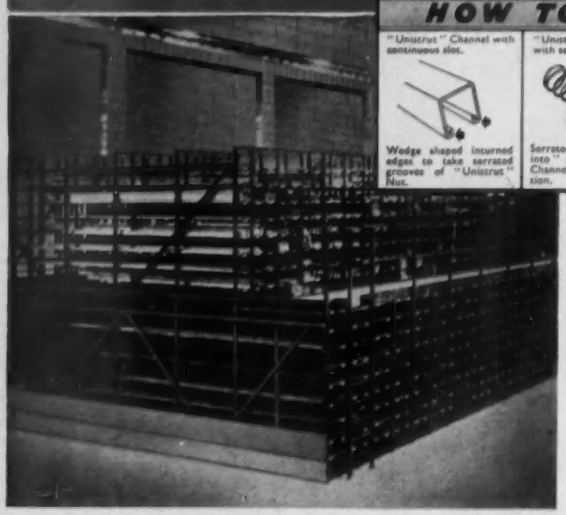

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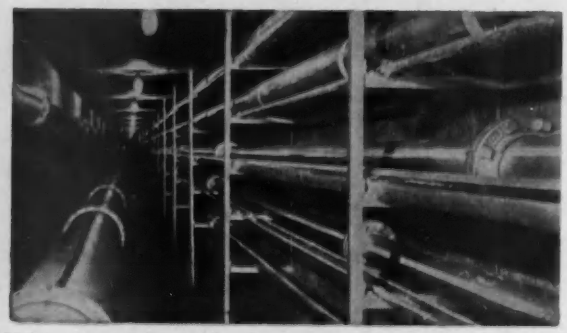

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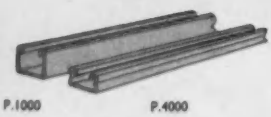

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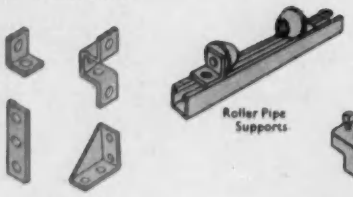

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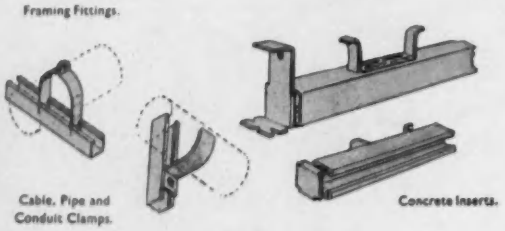

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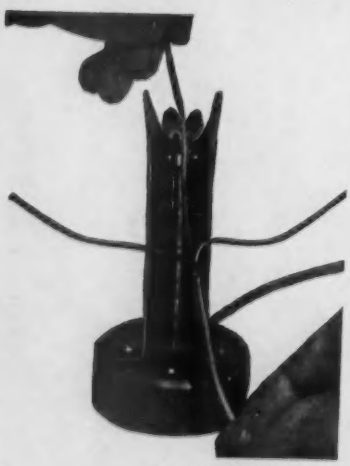

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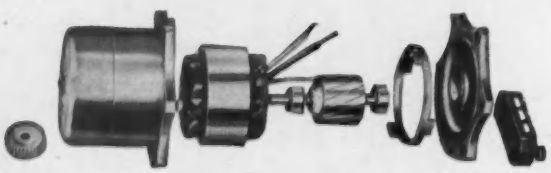

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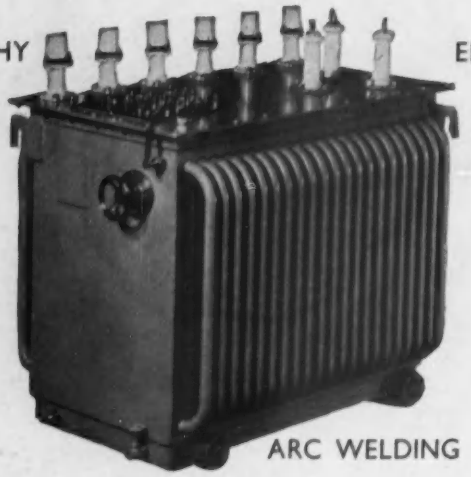

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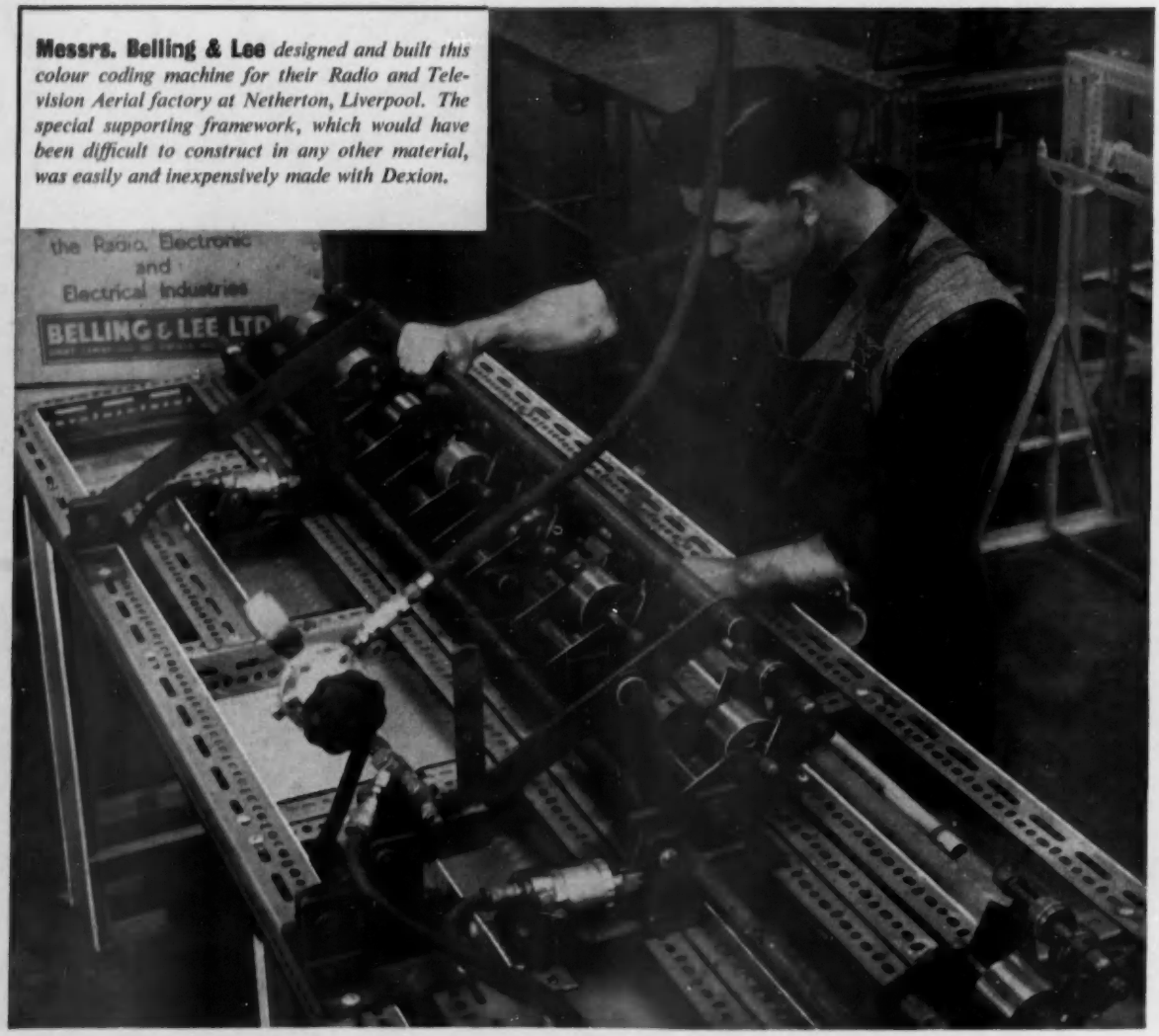

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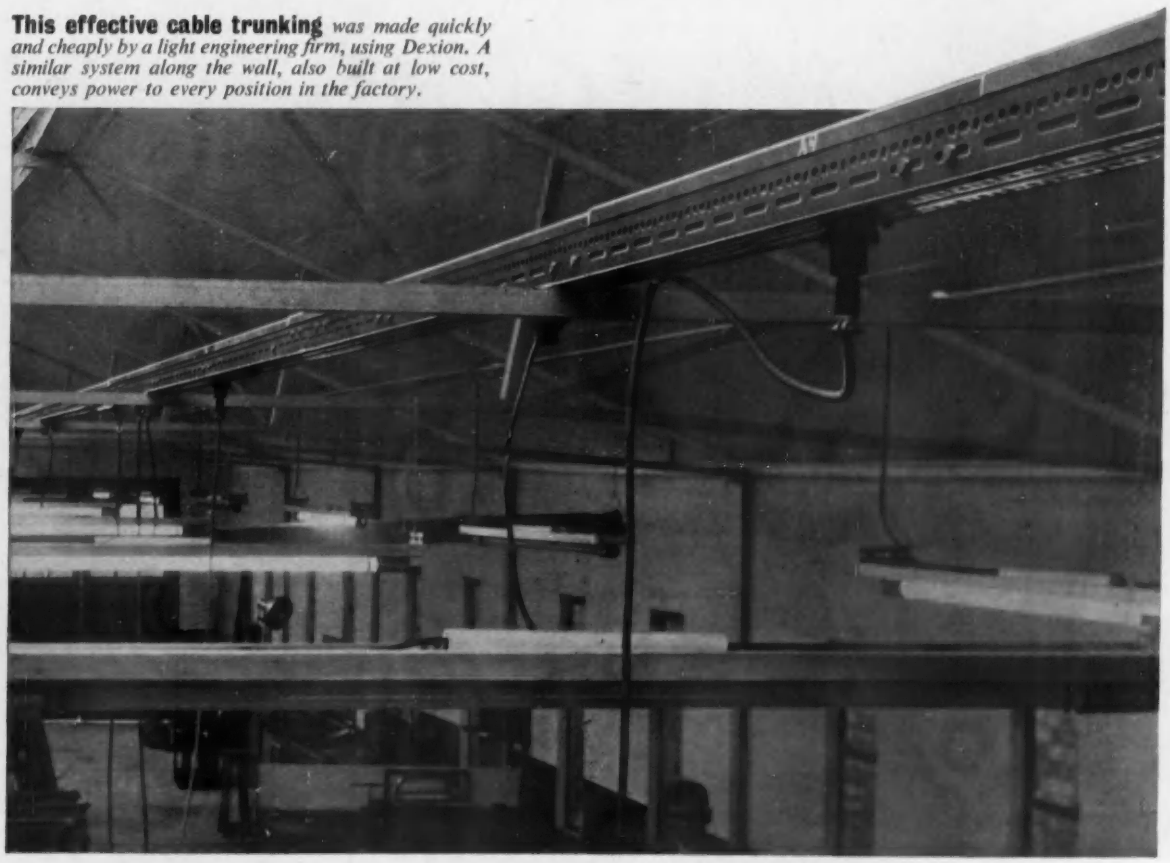

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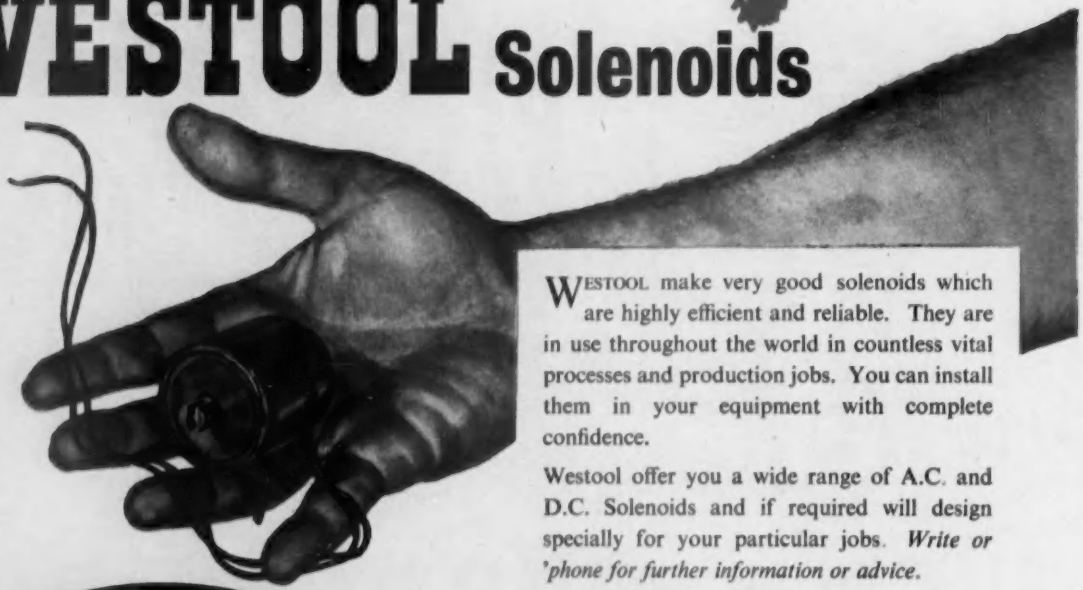

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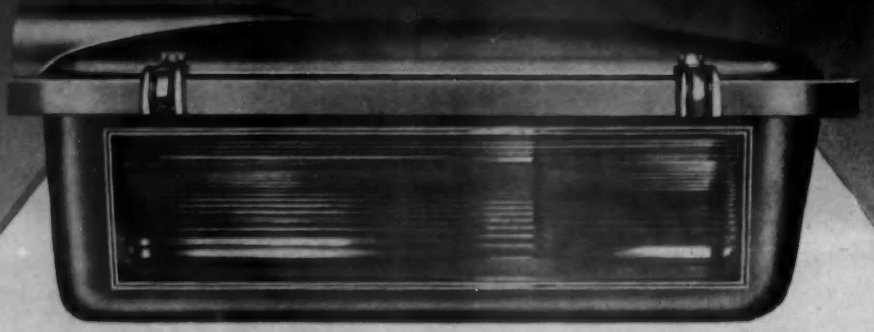

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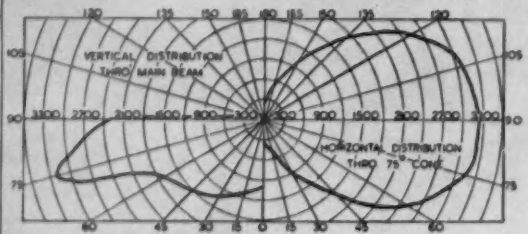

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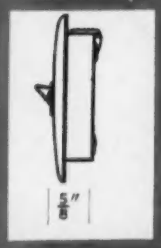

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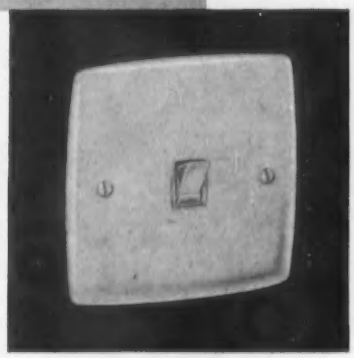

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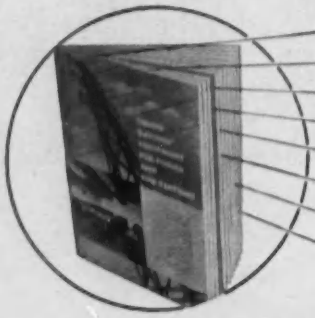

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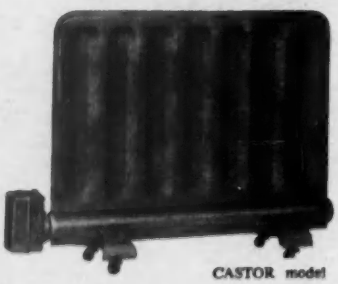

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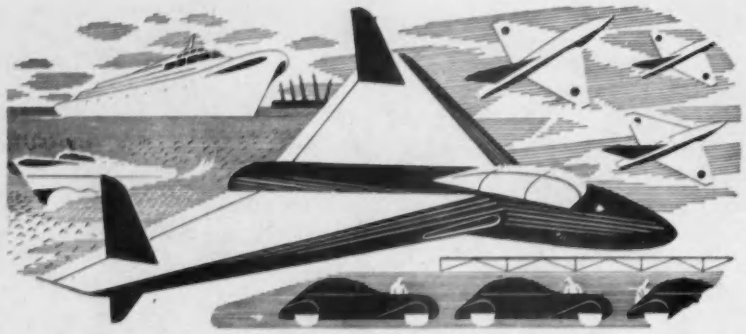

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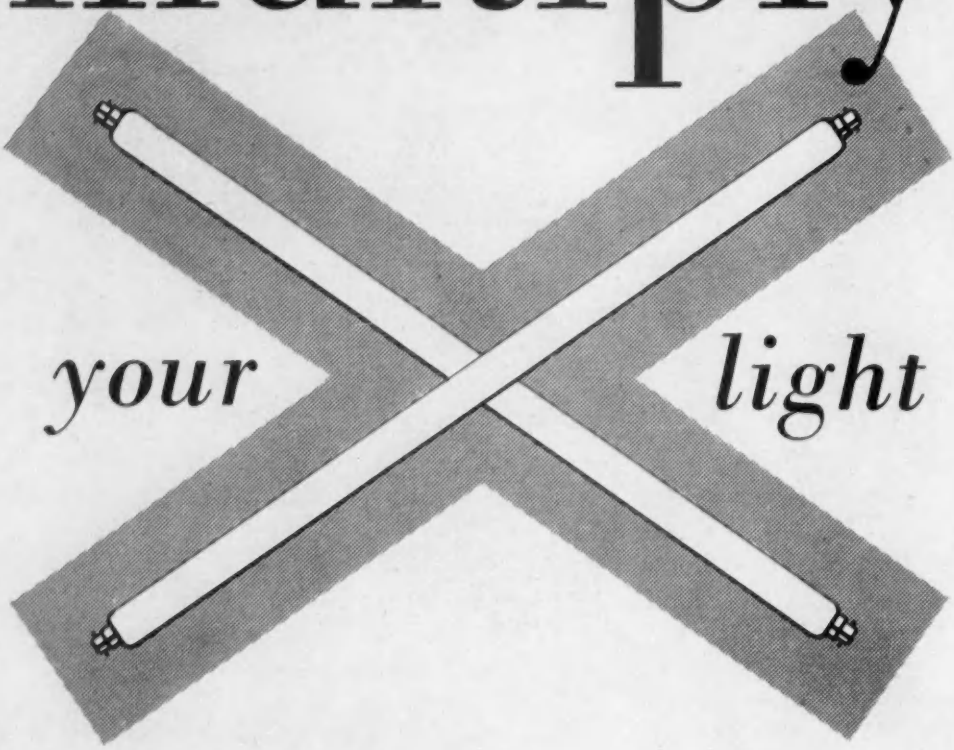

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ELECTRICAL TIMES

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Telegrams: Equivolt, Estrand
Telephone: HOLborn 6016

Editor and Managing Director:
ROY BALDWIN, M.I.E.E., Barrister-at-Law

Assistant Editors:
J. K. JOHNSON, B.SC.(ENG.), A.M.I.E.E.
K. C. POUNDS, B.SC.(ENG.), A.C.G.I., A.M.I.E.E.

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PLANT PROGRAMME UNDER THE AXE

Changes of purchase tax on domestic electrical equipment and competitive goods have an immediate importance which overshadows other effects of last week's budget statement for the electrical industry. Yet in some ways what was said in Mr Butler's speech about capital investment presages changes of more far-reaching importance than a set-back, perhaps temporary, in appliance sales. Admittedly, in reporting that the C.E.A. had asked area boards to make an all-round cut in expenditure, Mr Butler was merely confirming earlier statements on this subject, notably Lord Citrine's, that there was to be a ten per cent reduction in all sectors of electricity supply spending. This reduction presumably extends to the Scottish boards as well. But the Chancellor's statement had a new and threatening look in its comments on future plant installation programmes. He gave a warning that when the annual investment programmes are shortly submitted to the Government by the nationalised industries, they will be examined with a much more critical eye than previously. There seems here a suggestion of previous softness in regard to spending that certainly does not apply to the electricity supply industry. Memories of the long fight to gain permission for 2,000 MW per year of new plant are too recent for any such assumption to be accepted. It seems, then, that it may be necessary for those at the head of the supply industry to begin again the task of educating the Treasury in the fundamental part that a sufficiency of electrical power must play in any plan for increased production.

SPRING FAIRS

Rebuilding the British Industries Fair has proceeded apace in recent months. When the managing director of the company which now runs this enterprise met the Press last week, he was able to speak in terms of expansion, certainly a change from the atmosphere that has prevailed in recent years. One aspect of this expansion theme is the hope that established exhibitions at present appearing independently, may choose to be held under the auspices of the B.I.F. The carrot extended to encourage this development, is participation in the Fair's world-wide publicity activities. For the electrical industry the suggestion raises again the much canvassed question, whether the A.S.E.E.-sponsored Electrical Engineers' Exhibition should transfer from increasingly successful independence to become a major, but essentially subordinate, part of the national Fair. For the immediate future this seems to be ruled out by the sheer size which the Electrical Engineers'

Exhibition has attained. The special character and aims of the exhibition also extend the probability of continued independence. This will not, of course, leave the industry unrepresented at the B.I.F. The new electrical section at Olympia is already assured of influential support, and it has some interesting possibilities for the future in the special electronics section which is being introduced. Yet the situation as it stands leaves the industry with a disadvantage of no acceptably comprehensive international exhibition. This in spite of the fact that if the Ideal Home Exhibition is included (and it is increasingly being used to introduce new items of domestic electric equipment) there are four electrical exhibitions next Spring to attract prospective buyers.

ECONOMICS OF OUTDOOR CONSTRUCTION

When, almost two years ago, Mr F. H. S. Brown presented his I.E.E. Paper on the design features of the power station at Ince, considerable divergence of opinion was expressed in the London discussion on the actual savings which might be made by using outdoor or semi-outdoor construction. Mr Brown himself estimated the saving at about 10s. per kW for Ince—a semi-outdoor plant—although he quoted figures from American sources placing the saving for this type of power station as varying between 15s. and 45s. per kW. A recent review of American experience in the cost of outdoor and semi-outdoor stations, given in the *Electrical World*, indicates that savings can be considerably higher, although the difference in cost between indoor and outdoor stations tends to become less as the total installed capacity of the station increases. Thus the price difference for an outdoor station of 150 MW or more is given as about $17 (£6) per kW compared with $75 (£27) per kW for stations in the 60 to 74 MW range. The difference between British and American figures is remarkable, but it must be remembered that in many of the American stations climatic conditions favour outdoor construction which can be carried to extreme lengths, whereas in this country with variable weather conditions considerable protection is still required. Further British data are based on experimental examples only, at the moment. The experience of Willingdon "A" and Little Barford "B," two further stations of the semi-outdoor type will go far to extend them.

NUCLEAR POWER AND COAL

With the rapidly approaching use of nuclear energy for electricity power generation, some doubts have been expressed as to the future of the mining industry. No fears as to the prospects for coal were, however, contained in Dr Bronowski's lecture to the Association of Mining Electrical and Mechanical Engineers last week. He admitted that the coming of nuclear energy, together with the use of oil as a short-term policy by the C.E.A. presented a challenge to the mining industry, but was confident that this could be met by radical change of attitude toward coal utilisation. In his proposed plan, raw coal would cease to be used as a fuel, but would be processed to produce, initially, smokeless fuel, then would enter the chemical field in a major way and finally he envisaged coal-oil conversion. In this scheme, the processing of coal would be gradually concentrated at the pit head, and it was suggested that some pits would cease to ship raw coal, and process their entire production. The problems associated with such a major programme are great but are well within the capabilities of fuel and chemical technology. Already low-grade coal is being used for conversion into solid fuel and for gas production, and already the relative status of gas and its by products, coke and chemicals, is altering. The recent steep rise in coke prices as compared with the rise in gas charges is possibly significant. The ultimate effect of this change on the demand for electricity will need to be carefully watched.

NATURAL SUBSTATIONS

Substation design is a technical problem not lacking in complications from the purely engineering aspect. Since, however, from load centre considerations, the distribution substation is usually somewhere within the sight of consumers, considerations of appearance apply as well. This extra problem which faces the engineer concerned with substation design duly received attention in the chairman's address which Mr L. H. Fuller of the South Eastern Electricity Board delivered to the Southern Centre of the I.E.E. recently. In the address, the case for not disguising the substation as something else is argued strongly, and Mr Fuller professes to find an increasing spirit of reasonableness on the part of local planning authorities, concerning this and related matters. This preference for the functional form is particularly interesting since there seems to have been some trend recently in America towards the substation designed to look like a cottage or other less technical building. But Mr Fuller is perhaps nearer more general American practice in his preference for outdoor substations where possible, though his reminder that they do not come within the range of buildings requiring planning permission is a subtlety that would presumably be of no importance across the Atlantic.

CLEAN AIR CONTROL

The Clean Air Bill, which is being debated in the House of Commons today, commands the general support of all parties, and is likely to secure a second reading with little difficulty. However, the intervention of the summer recess has given more opportunity than usual for public discussion of the precise requirements, and out of this has come a disagreement that may cause some trouble when the committee stage is reached. The Bill proposes that power to deal with grit, dust and fumes, in respect of certain types of industrial undertaking—including power stations—should be given to the centralised Alkali Works inspectorate who have experience in this field, rather than be left with local authorities. The reason is clear to see: it needs specialist knowledge to evaluate the possibilities and incidental difficulties of pollution control measures applied to highly technical processes. Local authorities, however, fearing less urgency of action where control is geographically remote, want the opportunity to provide this technical service if they can. Their strength of opinion on the subject was voiced at meetings of the Smoke Abatement Society during recent months, and eventually it will show itself in the House.

Meteor

Kenya Power Development

LOW TANA STATION REINFORCES NAIROBI SYSTEM

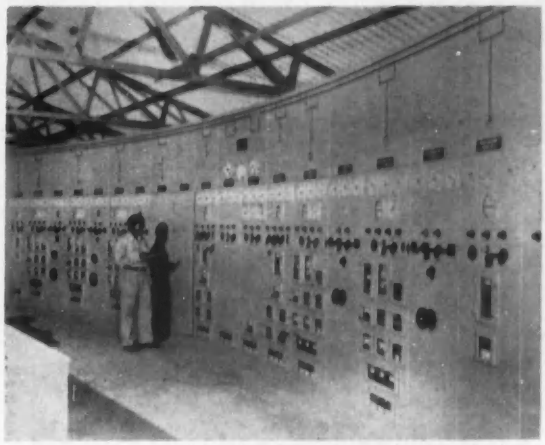
THE Low Tana hydro-electric scheme, recently opened by the Governor of Kenya, Sir Evelyn Baring, forms part of a small group of hydro stations involving the waters of the Maragua, Mathioya and Tana Rivers. The first two of these rivers are tributaries of the Tana. The stations in the group consist of the original Tana station, which is alongside the new Low Tana plant, and the Wanjii power station situated a few miles from the Tana site, but which is virtually part of the same general scheme.

Work began on Low Tana in 1953, and the scheme was completed in June of this year. The water used is derived from the Tana River which has been dammed by the Merila Barrage. Connection between the impounded water and the station itself is by a 1½ mile long tunnel, running at an average depth of about 150 ft below ground level and with maximum dimensions of 11 ft high by 10 ft wide. It is the first fully-concrete-lined tunnel in East Africa. About 75,000 tons of rock had to be excavated and lining took about 22,000 cu yd of concrete. The tunnel feeds into a descending pressure pipe at the power station site, and for a length of 315 ft before the junction of pipe and tunnel the latter is steel lined. A main control valve, 8 ft 9 in. dia is provided to control the flow of water to the turbines and is located at this junction point.

The Merila Barrage has been designed to impound sufficient water to operate the scheme. Owing, however, to the storm characteristics of the watersheds, four sluice gates are installed in the barrage. These operate automatically at time of flood, but for emergency circumstances additional relief can be provided by two self-operating siphons.

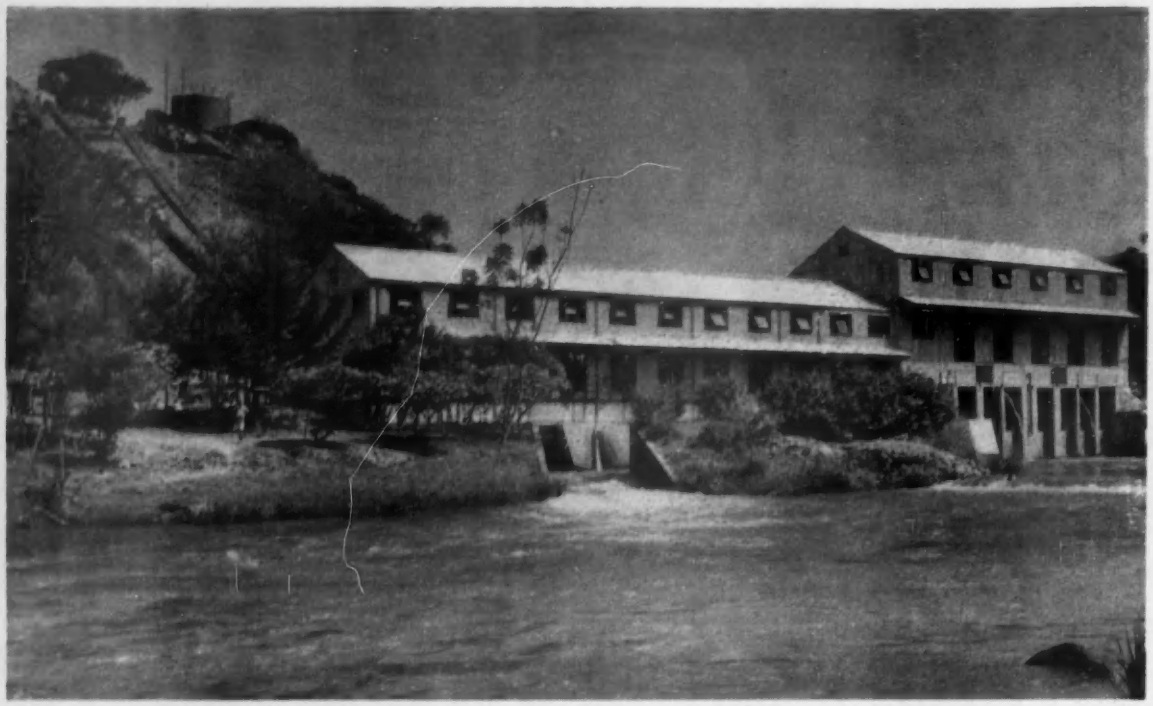
The completed Merila Barrage from the up-stream side. The sluice gates are operated automatically in time of flood

The power house of Low Tana consists of an extension of the former Tana station and contains two Francis-type vertical shaft water turbines and alternators supplied by the Harland Engineering Co., Ltd., of Scotland. These machines are of conventional design having main and pilot exciters mounted on top of the alternators. The generating voltage is 11 kV and the speed of rotation is 428·6 r.p.m. Voltage regulations is by B.T.H. electronic-type equipment. Rated output of each set is 4 MW. These units contrast with the plant in the original Tana station which comprises two 2 MW and one 2·4 MW horizontal machines with space available for one further 2·4 MW set. It should, however, be remembered that these units derive their power from a water system which is independent to a large extent of the Low Tana hydraulic arrangement. The Low Tana head is about 192 ft.



Power station control panel at Tana. Tana also controls the Wanjii station

The Wanjii station, which has a total capacity of 7 MW consisting of two 1 MW and two 2·5 MW sets is connected through two 11 kV overhead line circuits, 3·5 miles long of steel-cored aluminium of 0·175 equivalent copper section to the busbars at Tana. This busbar system is of the duplicate type, and is associated with Crompton Parkinson 11 kV, 350 MVA metalclad switchgear. The outfeed from Tana is by two groups of cables, each consisting of 3 pairs of single-core 0·5 sq in., paper-insulated lead-covered cables (two cables per phase). These run for 160 yd into the Tana outdoor 11/66 kV substation where they feed two 15 MVA 11/71 kV transformer banks. The transformers made by the Hackbridge and Hewittic Electric Co., Ltd.,



The Tana station. Low Tana is on the right, although the new station includes part of the lower building

are connected in delta-star with arc suppression coils connected between earth and the star-points.

Main Transmission

The Tana group of stations is connected to the Nairobi system, where the load lies, by two single circuit, three-phase, 66 kV lines of 0·15 sq in. steel-cored aluminium. These lines, which run parallel to each other are 46 miles long from Tana substation to Nairobi South substation. The country they traverse is fairly open, the vegetation consisting of rough scrub. These lines are unusual in that they are of wood pole construction of the "H" type, with a steel cross arm which carries the insulators. This arm is unearthed. The wood poles are of Swedish wood, pressure impregnated with preservative in Sweden. Care had to be taken that the preservative used was non-toxic as the country is largely devoted to cattle farming and there is an ever-present possibility of cattle licking the poles for the salt content. The main risk to wood pole lines in the area is not from game, but from termites which are present in abundance. So far, however, the preservative has been fully effective in preventing termite attack.

Although the isokeraunic level in the country traversed by the line is comparatively low, when storms occur they are unusually severe and to minimise the possibility of a direct strike on the line near to one of the two substations, the steel crossarms of the poles near the substations have been earthed, and a protective earth grid installed above the lines. Apart from the surge protection afforded by this system, it performs a second function in preventing a voltage gradient appearing on the wood poles in the event of an insulator fault. This is of considerable importance near the substations which are in populated areas, as the African is more susceptible to electric shock than the European, and is also likely, should he find a "live" pole, to dispose of his more worthless cattle by electrocution in order to claim full compensation.

The insulators made by Pilkington Bros. are of toughened glass as it has been found that they stand up most satisfactorily to the wide temperature variations experienced, and it is much easier to detect a faulty insulator by visual observation. Owing to the nature of the terrain, line maintenance presents a considerable problem, and experiments are to be carried out with a pulse-type fault locator of Australian design to provide a means of estimating the approximate distance of a fault from the substation.

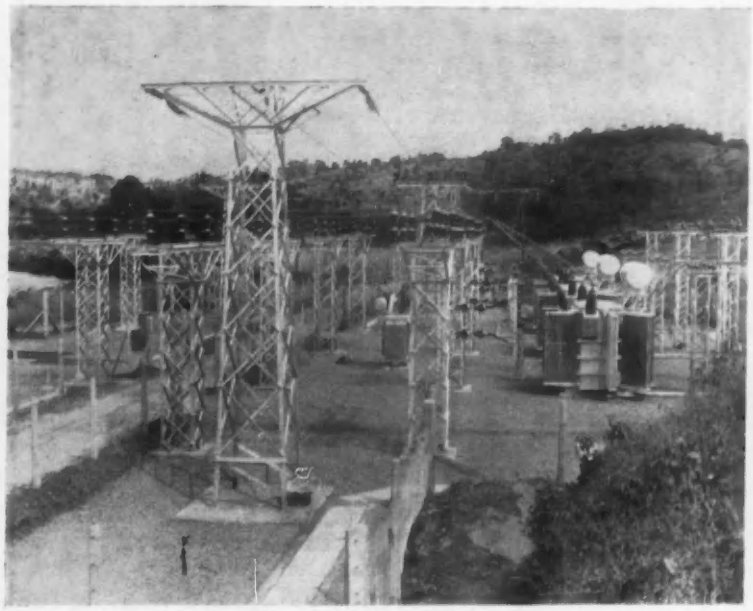
The performance of the line has been remarkably good. In the 2½ years it has been in operation only two outages have occurred, one due to a severe storm, and the other a fortuitous fault due to a wireless aerial being brought in contact with the line.

It is not, however, proposed to use wood poles on future lines due to the greatly increased cost of these as delivered at Mombasa, and the projected schemes will probably use steel structures.

Intertripping and communication is carried out by carrier over the lines themselves, as telephone communication over the area is liable to disruption due to various causes.

Future System Development

In its present form, the main generating stations connected to the system are Nairobi South with 17 MW of installed plant consisting of diesel units and one 2·5 MW gas turbine with a further unit scheduled; the hydro group; Parklands power station, with 5·2 MW of generating capacity, all diesel; and Ruiru power station with a total capacity of 5 MW of which 3·5 MW is diesel and 1·5 MW steam. Despite this variety of plant, which includes both high-speed and low-speed diesel generators, the system operation is extremely satisfactory. However, the demand for power is still rising, and a future step is an interconnection between Nairobi and the Uganda system centred round the Owen Falls scheme. This will involve the build-



The Low Tana substation, to show transformers and switchgear. The wood pole line can be seen taking off in the background

ing of a 132 kV line through one of the most difficult areas in the world, with an extremely high lightning level. The line will rise to over 9,000 ft, and will need extensive protection for the whole of its length. It is hoped to have the line in operation by 1958. The cost is estimated at about £3½m.

The resources of the Tana River are still great, and investigations are being made on a site at Seven Forks, about 40 miles down river from Tana, where estimates show a 100 MW output at normal river flow. This scheme is reckoned to cost about £12m.

The main contractors and consultants for the Low Tana and other schemes are Balfour, Beatty and Co., Ltd. Turbines and alternators were supplied by Harland Engineering Co., and main switchgear and control board by Crompton Parkinson, Hackbridge and Hewittic Electric Co. provided the transformers. Other electrical contractors were the British Thomson-Houston Co. for the electronic voltage regulators, Chloride Batteries for the auxiliary and tripping supplies and Wingrove and Rogers Ltd. for electric locomotives used during the construction of the tunnel. Steelwork for the dam came from Glenfield and Kennedy, and the butterfly valve in the pipeline was produced by Boving and Co.

At the opening of the scheme, Sir Evelyn Baring referred to it as an act of faith which would be justified by Kenya's development in future years. The Mau-Mau troubles he said had had remarkably little effect in checking this development, and now the country was resuming the pre-emergency pace for development. After outlining some of the future plans he paid tribute to the personal efforts of the then chairman of the East African Power and Lighting Co., Major C. M. Taylor, who had since retired and welcomed his successor Mr A. J. Don Small.

He cordially welcomed Sir Andrew MacTaggart who had flown over to Kenya specially to attend the opening ceremony, and congratulated the contractors for the scheme, Messrs Balfour Beatty.

Major C. M. Taylor, who retired the day following the ceremony said that the original tentative proposal to build a high-gravity dam on the Tana River was first put forward in 1928, and gave rise to considerable controversy. The present scheme fortunately did not involve any flooding of land which was not in any case affected by the normal flood flow of the river.

Withdrawing an Obsolete Ducted Cable

MANY services, including two existing h.v. cables, pass over the Galton Bridge, built in the early part of the 19th century by Thomas Telford. In the course of a reinforcement scheme to meet the growing industrial demand for power, engineers of the Smethwick and Oldbury District of the M.E.B. found it necessary to take another 11 kV cable across the bridge. Because of the possibility of damage to the structure and to avoid disruption of traffic on this important highway, it was decided to withdraw an obsolete cable from its steel conduit and replace it with a new cable.

Examination revealed, however, that the old cable, laid just over 40 years ago by the S.W. and S. Power Co., had become firmly welded into the steel conduit. The steel pipe was 3½ in. dia and the old cable passing through it was 2⅞ in. dia, with double steel tape armour, plus a jute covering, heavily compounded with bitumen.

After unsuccessful efforts to withdraw the cable by hauling with a winch on the core, Mr A. E. Price, engineer of the South Staffs and North Worcs Sub-Area of the M.E.B., suggested that the cable might be withdrawn by melting the surrounding bitumen compound by passing current through the old cable. Following successful experiments with a 20 yard length of the old cable, this method was adopted by the District Engineer, Mr H. Hawkins.

About 240 yd of the old cable had to be removed. This was divided into two 120 yd lengths at a central inspection chamber.

Current was taken from a 500 kVA transformer at a nearby substation and 230 amps passed through the core of the cable, the return being the armouring, and the cable was warmed up in this way for two to three hours. At the inspection chamber all cores of the cable were bonded together to form an "American eye" and by this means the cable was attached to a chain, which was hauled by a 10-ton, 120 h.p. mobile crane vehicle hired from a local steelworks.

The first 120-yd length, which lay straight in the steel pipe, was withdrawn without difficulty after preliminary heating, but the second length, which curved, had to be broken at an intermediate point and was then successfully withdrawn in two lengths of 80 and 40 yd.

Control of Electric Heater Batteries

METHODS OF OPERATING UNIT HEATERS TO BEST ADVANTAGE

By J. RUSSELL HICKMOTT

THE control of small unit heaters presents no unusual problems although there are a variety of circuits in use to cover particular applications. A brief consideration of these may be of interest as a basis for appreciating the somewhat more complex controls necessary in the case of large individual heaters.

The simple unit heater consists of an electric heater battery, a fan, and a hand-operated control switch which controls both items. In addition a high temperature cut-out is normally included in the heater battery casing to switch off the heater in the event of fan failure.

If the fan is required for use in warm weather the circuits are split to give individual control. This, however, involves an interlocking circuit to prevent the heater being switched on without the fan. In other words the heater is connected to a sub-circuit of the main fan circuit through a separate control switch as shown in Fig. 1.

This simple circuit is not entirely satisfactory because overload protection is not provided for the fan motor. If, however, such protection is fitted operation will leave the heater connected until it, in turn, is switched off by the high temperature cut-out. The inclusion of a contactor in the circuit as shown in Fig. 2 will provide added protection by switching off the heater immediately the trips operate.

If thermostatic control is included in the circuit using the special thermostats made for this application which include a hand switch in parallel with the contacts the circuit would be as shown in Fig. 3. In this way the fan can be used for ventilating purposes by closing the thermostat switch and opening the heater isolating switch.

Large Heater Batteries

The control of large single heater batteries depends upon the exact function of the heating system. For example, if the heater is included in a purely ventilating system its purpose is often restricted to raising the incoming air temperature to prevent cold draught and it does not contribute to the general heating of the space involved.

In this case the important factor is the discharge air temperature and the controlling thermostat can be fitted in the discharge air duct. It is likely, however, that the battery will be of several kW loading and some form of step control will be necessary to graduate the application of the load on the mains.

If the load is, say, 15 kW it may also be necessary to balance it across three phases. The exact number of steps must also be considered in relation to the temperature rise of the air. It can be assumed, however, that the full loading represents about the heat requirements under full heating conditions. As the outside temperature rises the required load becomes progressively less. If the number of control steps are too few the control system will never be able to establish a suitable loading for the various conditions. The greater the number of steps the less the controls will hunt.

There are, however, practical and economic limitations

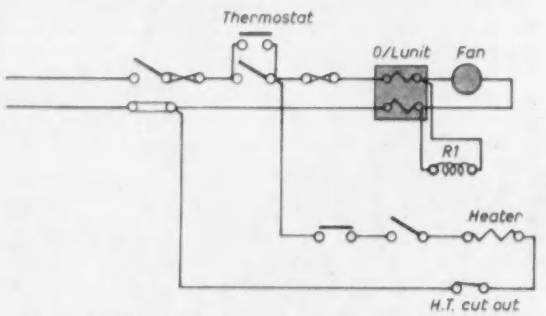


Fig. 3. Modification of circuit to provide ventilating facilities

to the number of control steps that can be provided. A convenient arrangement in the case under consideration would be fifteen 1 kW steps. If this number is unnecessarily large the steps could be reduced to five 3 kW steps.

The schematic circuit for fifteen steps is shown in Fig. 4 from which it will be noted that each step is treated as a single-phase element. In this way it is often possible to avoid the use of contactors. The capacity of the step controller switches must be kept in mind. Usually they are limited to 5 amps non-inductive load at 250 V. It is, therefore, essential to provide a neutral conductor to the heater elements even when the load is balanced.

The basic wiring diagram for a five-step 3 kW balanced system is given in Fig. 5. It will be noted that five contactors are required for the 3-phase switching.

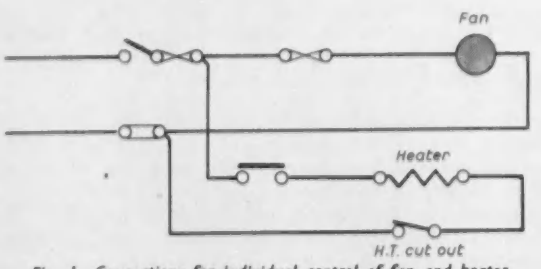


Fig. 1. Connections for individual control of fan and heater

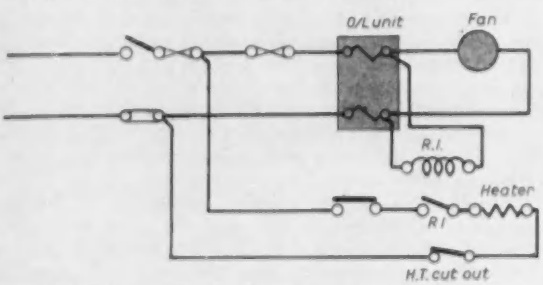


Fig. 2. Modification of circuit to provide added protection

Heating Systems

Where the heater battery is also providing for the space heating the control must be effected as a function of the space temperature. There is, however, some difficulty in positioning a single thermostat in a large space so that it will respond to average temperature conditions. Further, the introduction of 100% fresh air is unnecessary and it is

usual to recirculate a proportion of the air already heated. Thus the return air duct is a satisfactory point to fit the control thermostat. There are, however, two further factors which must be taken into consideration to ensure a satisfactory control system.

Depending upon the quantity and temperature of the fresh air it is obviously possible for the discharge air temperature to be low enough to cause a cold draught. In other words, if the return air temperature results in the heater battery being shut down the fresh air temperature may be low enough to cause the discharge air to be below space temperature. This point can be followed by reference to the system layout shown in Fig. 6.

It is usual practice, therefore, to include a further thermostat in the discharge air duct which acts as a low limit controller and prevents the discharge air temperature falling below the space temperature. This does not interfere with the accurate control of the space temperature as clearly the space temperature will not be increased if the discharge temperature is at or below the space temperature.

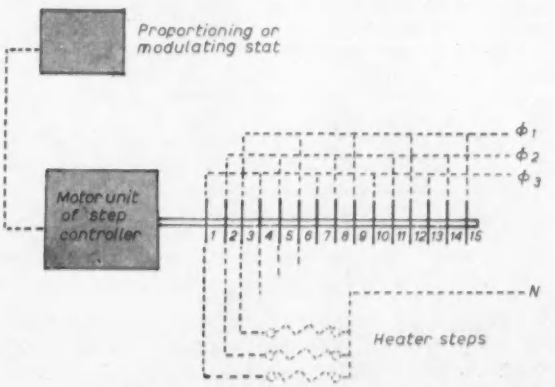


Fig. 4. Schematic circuit for fifteen step control system

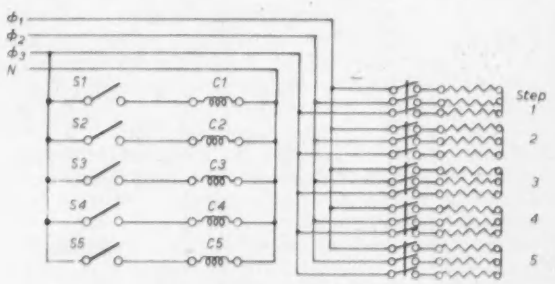


Fig. 5. Basic circuit for a five step balanced system

Another problem with the circuits so far described is due to the fact that on switching the system "on" from cold or following a supply failure the control thermostats will be calling for maximum heat. This would, of course, result in the full load of the heater battery being switched on in one step.

In order to prevent this possibility the circuit can be modified to ensure that the step controller always commences its operation from the zero or "off" position after a supply interruption. This is effected by using a back contact on the first step of the step controller and a relay. The theoretical circuit for a heater battery control system including all the above-mentioned features is shown in Fig. 7. The control equipment is of the potentiometric type which consists of a temperature sensitive controller and a geared reversing motor which drives the step controller.

The temperature sensitive controller is essentially a potentiometer which is positioned as a function of the temperature and is included in a "bridge" circuit with another potentiometer mechanically coupled to the motor gearing. Thus a movement of the temperature sensitive potentiometer causes an out of balance current in the balanced relay which, in turn, energises the motor. The motor then runs until its own potentiometer has again balanced the circuit.

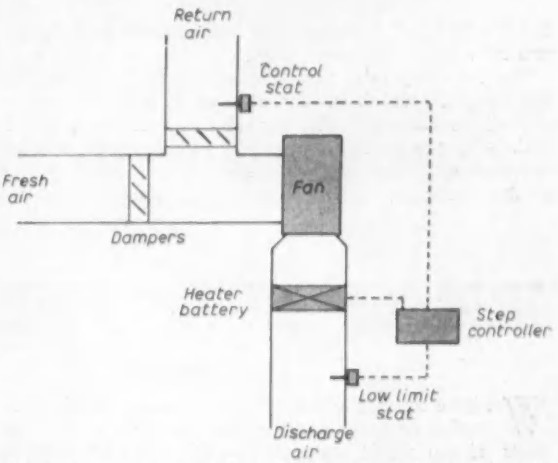


Fig. 6. Typical air system layout. Reference to the text shows how this can provide air at a lower temperature than the space temperature

The low limit thermostat is a further potentiometer type controller included in one side of the "bridge" circuit so

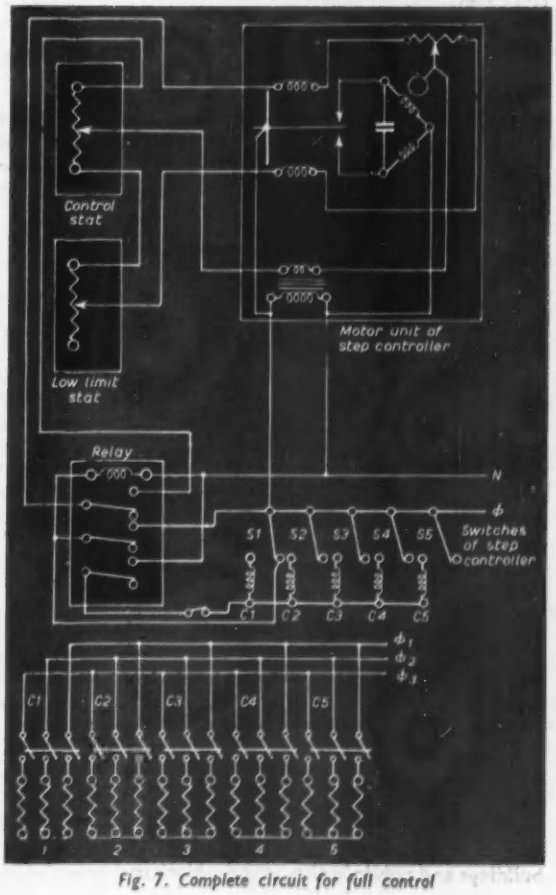


Fig. 7. Complete circuit for full control

that the "bridge" is unbalanced if the discharge temperature falls below the preset level.

The recycling relay included in the first step of the step controller circuit has one of its set of contacts in series with all the contactor coils. The relay can only be energised initially by the back contact of the step controller and an interruption of the supply therefore causes the relay and all the contactors to drop out. Upon restoration of the supply the step controller motor is energised to run to the zero position. When this point is reached the relay is again energised and the step controller begins to move to the control position bringing each step into circuit in sequence. It will be noted that the relay provides its own hold in circuit. The transformer is required to provide the low voltage supply for the control circuit although it will be noted that the step controlling motor operates at supply voltage.

READERS' VIEWS

Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor

Japanese Competition

WE have up to the present been very successful in exporting to India and the Far East as well as other parts of the world, but just recently have encountered Japanese tenders of the kind which renders price competition impossible. Two particular instances are as follows:

Quotation to India, for a large number of 33 kV isolating switches, £114. 6s. 5d. per switch; Japanese price, £85 per switch. In the past we have secured many valuable orders from this customer.

Formosa: Our total price on a contract including 161 kV switches U.S. $65,635: Japanese Tender U.S. $35,112. In the past we have also secured orders for similar equipment from this customer.

We are specialist manufacturers of high voltage outdoor equipment and we export a large proportion of our total production to some forty-six countries throughout the world. Up to the present we have been able to successfully combat competition from all other countries where we have been able to tender on equal terms.

At the present time the loss of contracts such as those above are not serious as our order book is full, but we thought your readers might be interested in the above concrete examples of the type of competition we may have to meet in the future.

P. H. Jackson (Joint Managing Director),
LINE EQUIPMENT LTD., LONDON, E.C.4

Advantages of the Trolley-bus

YOUR leading article last week features the coming trolleybus substitution by oil-burning buses. As far as I can ascertain, the only advantage claimed by London Transport Executive for the oil-bus is some superior mobility in traffic. Against this doubtful contention the disadvantages are positive and overwhelming. To mention only some of them, dismantling the 253 route-miles of overhead system, worth many thousands of pounds per mile and having still a quarter of a century of life in it will necessitate the provision of new public lighting equipment costing each borough something between £20,000 and £30,000. In addition the ratepayer will have to make good the several thousand pounds per annum pole wayleave which will no longer be paid by the Executive. The loss by the Electricity Supply Industry of the large traction load of above-average load factor cannot but affect adversely the charges for supply generally.

As for public health, I have calculated that over a million cu ft of poison gas mixture will be released at breathing level in the streets of one typical borough daily by the new buses only; heavier than air, it will lie in the tall narrow highways and have its chemical way with public buildings and public health. Of the black carbon emissions the British Medical Association's policy is now expressed by the following resolution:

> "Resolved that this meeting of the Representative Body urges the Council of the British Medical Association to draw the attention of transport authorities to the possible dangers of fumes from diesel engines; to the remarkable coincidence between the increased use of diesel fuel for transport and the rise of mortality from lung cancer and other respiratory diseases; and views with alarm the forthcoming replacement in London of 1,800 trolleybuses by diesel-engined vehicles."

The carbon particles also act as nuclei for the formation of smog in which the sulphur dioxide contributed by the exhaust gas killed so many in London two winters ago.

The Executive states (in spite of the obviously great expenditure implicit in the changeover), that fares will not go up as a direct result of the substitution; I doubt if even the Marines would credit this after noting in the Chambers Report that (apart from coaches) the trolleybus has been the only L.T.E. vehicle capable of consistently operating at a profit.

Adverse public opinion may be the one possible means of reversing this misguided intention, and in this the B.M.A.'s present policy may assist. It is difficult to get articles on the subject published in the National Press; publication in the Electrical Press is of little value, as naturally the electrical world is already of one mind on it. Electricity Boards cannot oppose the declared decisions of L.T.E. backed by the approval of the Minister and his Committee of Inquiry; for political expediency is paramount. B.E.D.A. collects all the information, the pros and cons, broods over and pigeon-holes them like a well-organised colony of magpies and, doubtless for the same reasons of expediency, does nothing, and anything that B.E.A.M.A. may do must be suspect as inspired by manufacturing interests.

"Engineer."

Plugs and Plugtops

"MEGOHM'S" notes on the confusion arising from the misuse of the term "plug" to signify "socket-outlet" only touch upon a very real problem; the necessity to use clear and precise English at all times.

So far as the present case is concerned the I.E.E. regulations and Chamber's Technical Dictionary concur in defining a plug as a device having metal contacts for inserting into a socket-outlet. Engineers would do well to concentrate on using the correct terms rather than coin clumsy alternatives such as "plugtop."

Other examples of out-moded terms hard to die are "condenser" for "capacitor," "V.I.R." for "V.R.I.," and (may I mention it, Mr Editor?) the continued use of "connection" for "connexion."

James G. Potter.
FYFE, SCOTLAND.

(*"Connection," while not preferred by the O.E.D., is yet used by the B.S.I.*—ED.)

The Mining Industry

—and Nuclear Power

NO FEARS FOR THE FUTURE ACCORDING TO DR BRONOWSKI

THE repercussion of the development of nuclear power on the coal mining industry was discussed by Dr J. Bronowski, Director of the N.C.B. Central Research establishment, when he delivered the seventh "W. M. Thornton Lecture" to the Association of Mining Electrical and Mechanical Engineers last Friday at York.

For ten years, said Dr Bronowski, since 1945, people in the industry had been asking themselves, "how will the coming of atomic energy affect coal mining in this country?" In every argument about the future there was someone who said that atomic energy was already here, and someone else who said that coal would last our time. These statements, one as much as the other, were neither right nor wrong. Without a time-scale of future progress they were meaningless. A timetable was, however, available in the Government White Paper published in February. Since that date there had been an addition to the original programme, and a statement had been made on the use of oil in power stations. Both these had a bearing on the main subject.

The Nuclear Programme

The nuclear power first programme covered the building of 12 power stations in the next ten years with a total capacity of about 2,000 MW, representing an equivalent coal consumption, on base load, of some 5 to 6 million tons per annum. By 1965, however, the yearly coal needs of the C.E.A. would have risen not by 5 or 6 million tons, but by perhaps 25 millions. The Authority would need new plant to burn this, not with a capacity of 2,000 MW but much over 10,000 MW. The White Paper estimated the cost of the nuclear programme for the next ten years at £300m; but the C.E.A. would be spending three to four times as much as this on the new coal- and oil-powered stations which it would also need.

It should not, however, be forgotten that the nuclear programme was a rising programme, and did not include details or cost of those stations which might be begun between the present date and 1965, and which would not have been finished by that date. Indeed, already an increase had been announced, when in June the Minister stated the proposal to begin building two or three further atomic power stations before 1960. Another Ministerial statement in July indicated the intention of the C.E.A. to adopt a programme for oil-burning in power stations. This latter was quite different from the nuclear programme: it was a tactical programme to avoid imminent shortage of power, while the nuclear programme was a strategic plan with a steady development in the future. The oil programme, as Dr Bronowski saw it, was meant to ensure that in the ten difficult years following the present time, the C.E.A. would not need to raise its demand from the coal industry to more than 45 million tons per year. In round figures, the C.E.A. intended to use in 1960 the equivalent of about 55 million tons per year, of which the equivalent of 1 million tons would come from atomic energy and of 9 million tons from oil. In 1965, the C.E.A. expected to use the equivalent of nearly 70 million tons of coal per annum, of which 6 millions are to come from atomic energy and, as an estimate, something less than 20 million tons from oil. After this, no expansion of the oil requirements should be necessary. For example, in 1975 the C.E.A. would possibly use the equivalent of 100 million tons of coal per year, of which atomic energy should supply about 40 millions, leaving the coal and oil figures at their previous values.

This might seem a depressing prospect to many in the mining industry but, in Dr Bronowski's view, was not necessarily so. Atomic energy did not challenge the use of coal; it challenged the use of coal in making electricity. This was a specific and fairly narrow field. Making electricity was one of the lesser uses of coal, and would remain so even if, in the next twenty years, electricity (and the waste steam from power stations) came to be more widely used to heat houses, drive trains and the like. This year, power stations would take, in round figures, over 40 million tons of coal out of a total output of 220 million tons. By 1975, if there were no atomic energy and no oil-firing they would take, out of a total output of about 250 million tons, some 80 million tons. Thus, although electricity was the largest single consumer, yet what it bought was now, and would remain in the future only a fraction of the total quantity mined.

Coal as a Chemical

Nuclear energy challenged, in the wider sense, the use of coal as a low grade source of industrial power. This wider definition had a practical advantage because it could include the application of nuclear energy to ordinary industrial steam raising, a process which although not mentioned in the White Paper, would probably slowly happen.

Coal was a fuel and a chemical raw material. The economy of the country in the past had been founded on coal as a source of power, and we had had no free choice; we had had to turn as much coal as we could into power. The coming of atomic energy was thus a real liberation, and would lift from the mining industry the burden of producing coal mainly for conversion into power. The first step would plainly be to turn coal into smokeless fuel, first for domestic use and then for industry. The by-products from this process could then be used for supplying various fundamental materials to the chemical industry. Naphthalene, and phenols were typical examples of these processes. The third step would be coal to oil conversion as a standby against the time when natural oil supply would become depleted. The oil reserves of the United States, uncertain as was their exact total, could not well prevent a fall in production there beyond some date between 1960 and 1970. And by that time the cost of oil would have risen to a value where oil from coal could compete economically. In this country the date was further off, and overall it was foreseeable that oil from coal should be in a position to compete with Middle East oil within say twenty years.

One implication dominated all others. The mining industry would have to become progressively a processing as well as an extraction industry.

Standards Progress

INTERNATIONAL WORK INCREASES FOR BRITISH STANDARDS INSTITUTION

ELECTRICAL WORK features prominently in the annual report for the year ended 31st March, 1955, which has been recently published by the British Standards Institution. The report reviews present and future work over the whole range of standardisation, including the increasing amount of international co-operation that is being practised.

International work

An example of this international work is the review of safety requirements applying to domestic electrical equipment in this country and in Australia respectively. A memorandum is being drawn up with the hope that it may serve as the basis for a Commonwealth-wide agreement on such safety standards. Commonwealth interest is also apparent in the tentative decision to re-convene the conference on electric cables which was held in 1953. Australia apparently has some doubts about the underlying reason for changes incorporated in the last edition of B.S.7.

The old problem of socket-outlet standardisation is extending to the industrial field, and a conference was held in March 1954 to review the position. As a result, work has been carried out on the drafting of standards, some of this work involving liaison with the International Commission on the Rules for the Approval of Electrical Equipment (C.E.E.). It is hoped that the result will be an internationally accepted standard.

A British domestic standard which is under consideration is that dealing with electric fires (B.S. 1670). Since the Fireguards Regulations came into operation, differences of interpretation about the requirements for testing the guard have become apparent.

International standardisation decisions cannot always be accepted without question. An example of the work of the B.S.I. in ironing out differences arises in connection with steel-cored-aluminium overhead line cables. A decision was taken at the Philadelphia meeting of the I.E.C. which is considered liable to preclude the use of reinforcing wire drawn after electrogalvanising. Such wire is, of course, used in the United Kingdom, and is exported to other countries. There is also dissatisfaction, the report states, with the value for the electrical resistance of annealed aluminium fixed at the Philadelphia meeting of the I.E.C.

Finally in this review of home developments, mention may be made of a memorandum which has been prepared on insulation co-ordination. This has been under consideration by various interested sections of B.S.I., and is now under revision with the intention of publication as a British Standard. It will deal with the choice of protective services and the appropriate settings for them, and with the co-ordination of h.v. impulse and power frequency tests on transmission system equipment.

B.S.I. now provides the secretariat for electrical engineering codes of practice jointly with the I.E.E. During the year under review, work was begun on one new code—"maintenance of insulating oils for transformers and switchgear." This statement in no way represents the true range of activity, however, for there were several codes in the course of preparation or of revision. Amongst those being revised is the basic "electrical installations—general." It is stated that the object here is to prevent overlapping with the I.E.E. Wiring Rules.

B.S.I. Trends

Reviewing the year from the aspect of B.S.I. generally, the report comments on significant changes in the scope and direction of the Institution's technical and administrative services to industry. During the year there were for the first time for many years fewer new and revised standards published, but this does not provide a true reflection of the Institution's activities. For instance, it is considered that more time may have to be spent in future on measures to simplify the use of standards, and the amount of international work is certainly on the increase. The international work, some examples of which have been given in this article, affect matters in two ways. It directly reduces the staff time available for work on British Standards, and British Standards need to incorporate internationally agreed dimensions, limits, etc.

At the end of the year the technical staff of the Institution were reorganised into Divisional Chief Technical Officers, Senior Technical Officers and Technical Officers.

The report, which includes a detailed review of the work of I.S.O., I.E.C. and C.E.E. for the period concerned, is published by the British Standards Institution, price 5s.

Faraday House Changes

THE controlling body of Faraday House, the famous electrical engineering college, has been reorganised as a "charity." This was stated by the Principal, Dr W. R. C. Coode-Adams, at last week's annual dinner of the Faraday House Old Students Association. Recalling that the college had been founded as a private enterprise venture to provide laboratory testing of electrical instruments as well as a training establishment, Dr Coode-Adams said that the change had been made "with the generous support of the shareholders of the old company." The move recognised the prejudice against training being in private hands.

Dr Coode-Adams also recalled that from the beginning of this year Faraday House had operated a three-year course of full time study in place of the traditional sandwich system. It was planned in the future to operate a sandwich system for firms who wished to put forward promising apprentices.

380 members and guests gathered at the Savoy Hotel, London, for this function. The toast "Faraday House" was proposed by Sir William Penney (U.K. Atomic Energy Authority). Speaking of electrical energy requirements twenty years ahead, he estimated that nuclear energy would be able to supply half the excess requirements above present demand.

"The Guests" was proposed by Mr E. L. Gethin and replied to in suitable style by Sir Ian Jacob (B.B.C.). Mr L. H. Short proposed the health of the Chairman of the O.S.A., and to this Mr C. C. Ingles made a reply more serious than that usually met in this context. He claimed to detect in the electrical engineering profession signs of "being shackled to the past." The older members should remember that because a solution was tried twenty years ago and did not work, it did not follow that it would not work if tried today with the different background existing. He suggested that this applied both to technical matters and to human relations.

Drawing Board Network Analysis

D.C. CALCULATING BOARD AT ITS SIMPLEST

By G. LYON, M.Sc.(Eng.), A.M.I.E.E., Mem.A.I.E.E.

NOWADAYS every new development in electrical engineering seems to include more complication, but sometimes it is useful to go back to the beginning and see how simply a job can be done. Recently the author applied this process to the well-known "d.c. calculating board" and the outcome may interest and amuse others concerned with power system analysis. The method evolved seems capable of some extension.

For over 30 years fixed or adjustable networks of resistors have been used for solving power system problems, and more recently their use has been extended to other fields. The trend of development has been towards ever-larger models, incorporating refinements designed to increase the speed of operation, since the purpose of the calculator is to avoid protracted arithmetic. Nevertheless, for occasional use simple equipment will suffice so long as it is not too limited in size.

Reflection on this problem of size with simplicity led the author to a solution which could hardly be simpler, that is, to draw the network with pencil and paper. Uniform graphite films have already been used for field plotting problems. A diagram of graphite lines having resistances to scale makes a surprisingly satisfactory network for load-flow or short-circuit calculations. Resistances of practical values can be made with the softest grade of pencil, the electrical scale values being obtained by thickening each line until it has the required value by measurement. The accuracy and speed of solution are less than those of a full-size "d.c. board," but if care is used, not much less. Some practical points may be of interest.

Base Quantities

The resistances of lines that can be produced conveniently lead to the choice of a base resistance of 100,000 ohms. Currents of more than about 1 milliamp lead to breakdown of the conducting film and a convenient base current is 50 microamps corresponding to a base voltage of 5 V. This permits a current multiplier of 10 to be used without risk of damage to the network.

Apparatus

It is convenient to have a voltmeter to ensure the maintenance of constant voltage from the supply if a battery is used. A suitable arrangement of supply and measuring apparatus is shown diagrammatically in Fig. 1. Such a unit can be accommodated in a small cabinet in dimensions of the order of 12 in. x 6 in. x 6 in. The facility for measurement of branch currents is explained later.

A fairly smooth type of paper without glaze is best for the production of a range of resistances per unit length with reliably conducting characteristics. The finer grained type of cartridge paper is an example of a suitable grade. A standard 6B grade of pencil should be used.

With these materials, lines having resistances of about 0·05 per unit to 2·0 per unit per in. (500 to 200,000 ohms) are convenient to make.

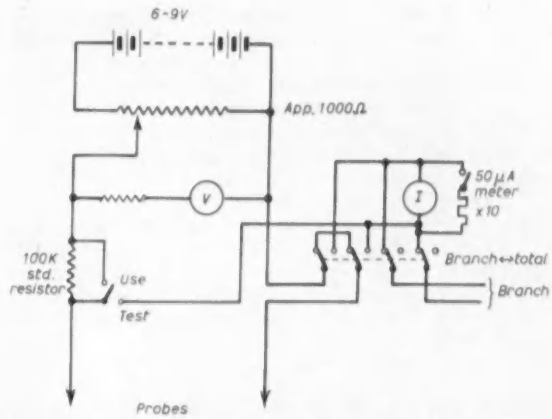


Fig. 1. Measuring and supply unit for drawing board network

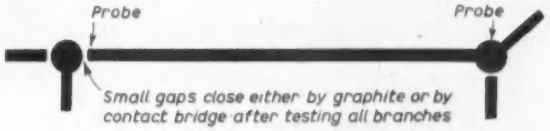


Fig. 2. Branch of network under investigation in test stage

Diagrams

The layout of the diagrams can generally be similar to the normal single line system diagram, with the exception that nodes must replace busbars, a heavy blob of graphite being formed at each node as shown in Fig. 2.

Choice of power base and dimensional scale is made bearing in mind the range of resistance available, as already noted. A few trials are required to develop facility in making this choice. For fault studies only one scaling has to be made, but for load studies it is convenient to choose a scale factor for the line network leading to fairly low values of resistance and one for the infeed resistances about five times as large.

If a network having several voltages is being studied it will be found that certain short lines have to have a high resistance and these are best made by doubling the line back in hairpin fashion rather than attempting to make it very thin. Normally the diagrams will be drawn with the minimum number of crossed circuits merely for clarity, but where cross-overs are essential they may be made by gumming a piece of paper over the first line to carry the second; the lower line will require checking since the gum may alter the value.

It is often inconvenient to bring all the infeeds to one point, but two or more common infeed points can readily be connected together by short lengths of flex, preferably of the hearing-aid type.

Application

The application to the calculation of power system fault currents will be obvious to those accustomed to using other methods. Unbalanced faults may be tackled by the usual symmetrical component method, the sequence networks being interconnected by means of short pieces of flex.

For load flow studies the infeed points require to be connected to one pole of the supply and the outfeeds or loads to the other pole: it is sometimes advisable to em-

ploy a higher voltage to permit a suitably increased scale factor to be used for the infeed resistances. A convenient method of making the infeed resistances adjustable is to form part of the resistance in an incomplete circle connected to the network at the infeed node and to the supply by means of a spring wiper arm pivoted at the centre of the circle; this in effect forms a carbon track rheostat at each infeed location.

It is unlikely that this method would be of much service in the application to uniform fields problems, but it may be of some service for ladder networks and similar problems.

It is necessary in load flow problems and convenient in many others to be able to measure the current in each branch. A convenient method of enabling this to be done is to employ small metallic spring bridges over a break in each line or a spring contact turret at each node, so constructed that a two-pole probe connected to the branch leads interrupts the circuit and inserts the meter when applied to the circuit in question.

For all these applications it is necessary to fasten external connections and interconnections to the graphite network as well as to attach branch contacts. This may be accomplished by providing the contacts with drawing pin points for use on a drawing-board or miniature magnets for use on a steel sheet background. The pins must be used only for fastening and not to make contact.

Handling

The dense lines required for satisfactory conductivity are not particularly susceptible to changes by a normal amount of handling, but it is necessary to avoid excessive movement of hands and instruments over the surface of the diagram.

Extremes of humidity can produce changes of resistance as large as 20%, but the variations of humidity that occur in a normal office do not produce changes greater than a few per cent.

The diagrams can be stored flat or rolled for long periods without changes of more than 5%. Folding is fatal.

Graphite Suspensions

Some experiments have been made using suspensions of colloidal graphite in water and in alcohol with the object of producing more durable diagrams than are obtained with pencil lines. While it is true that the resulting networks are more durable, there are difficulties in the production of the required values due to the change of resistance as the fluid dries. Hence the time taken to form the network is much greater. Satisfactory results can be obtained on paper with a water suspension, but the alcohol suspension appears to lead to lines of extremely high resistance unless they are consolidated by rubbing after the drying is complete.

Satisfactory semi-permanent networks can be made with with these suspensions on a hard insulating background such as bakelised paper.

In conclusion, it is hoped that this brief description may encourage others to experiment with networks of the kind described, especially for occasional use or made up in portable form.

The author is indebted to Merz and McLellan for permission to publish the article and Acheson Colloids Ltd. for assistance with the graphite suspension experiments.

Architects Confer on Lighting

THAT lighting has a valuable contribution to make towards securing good building with complete harmony of architectural and lighting design has long been recognised, and the conference inaugurated recently by the Electric Lamp Manufacturers' Association for architects should prove invaluable in bringing together representatives of the architectural and lighting professions and giving each an insight into the others' problems. After the opening by V. C. H. Creer, M.A., chairman of the E.L.M.A. Council, it was logical that the first subject for consideration should be that of lamps, whose use and abuse was dealt with by A. D. S. Atkinson, A.M.I.E.E., F.I.E.S., in a paper concerned largely with fluorescent lamps in view of the less familiarity with this type than with other commonly used lamps.

Of filament lamps, however, he pointed out that they are most suitable where a familiar colour of light is required with over-emphasis of the reds unimportant, dimming is necessary, a degree of sparkle or glint is desirable, or where the light is to be confined to a directional beam, apart from other considerations which may determine their suitability. After reviewing the types of filament lamp available, he went on to consider the question of colour, emphasising the importance of being aware of how the colour rendering proportions of different coloured lights vary. Complications appear when white light is used, since matching white light "chords" can be deceptive and this has led to so much criticism of fluorescent lamps in the past.

With the eye being far more sensitive to yellow-green than to red and blue, the natural tendency in making a fluorescent lamp of high efficiency is to arrange for most of the electrical energy to be converted to light energy of this colour. Although this produces a sensation of a lot of light, the colour rendering is not good in view of the comparative lack of blue and red energy. To get an adequate colour rendering, however, it followed that the lamp would be less efficient. On the other hand efficiency is not as important as it is often held to be and since fluorescent lamps are nowadays so efficient, the choice of a suitable colour can and should be put first where circumstances permit.

On the question of cost, which usually lies between filament and fluorescent lamps, the cost of the lamps and their consumption is less for fluorescent. On the other hand, a fluorescent lighting installation has normally a higher capital cost than the corresponding filament installation and hence the overall cost depends on the number of years the installation is to be kept in use.

In the ensuing discussion, one speaker mentioned a Scandinavian fitting in which the filament had been directly sealed into the glassware, thus eliminating a separate lamp, and he asked if a similar development were likely here. He also felt that flicker mitigated against fluorescent lamps. Another speaker emphasised that consideration of lighting was, or should not, be left until the end of a job, but felt that greater attention should be given to reflection factor and texture of interior surfaces.

Aspects of Distribution

LOCAL CENTRE ADDRESSES CONTINUE TO FEATURE THE SUPPLY INDUSTRY AS THE MAIN THEME

CONTINUING our review of Addresses given by Chairmen of Local I.E.E. Centres, it is seen that the overall theme of "Electricity Supply and Generation," reflected in the Addresses reported in our 20th October issue, has been continued by other speakers. Particularly is this true of the Southern Centre, whose Chairman, L. H. Fuller, B.SC., M.I.E.E., of the South Eastern Electricity Board, presented a survey of distribution substation designs.

One of the most important precepts is the segregation of plant, and, also, of cables. If a switchboard is other than small, the bus section should be segregated. Not only should doors open outwards but raised thresholds should be avoided unless the possibility of storm water exists. Pebble-filled oil pumps projecting in front of switchgear are also to be avoided—the access must by regulation be clear and unobstructed. For switchgear up to 33 kV, neither overhead crane nor even outside lifting beam or gantry is necessary. In the last 15 years, considerable progress has been made in regarding the normal 33 kV, 500 MVA or 750 MVA switchgear as distribution rather than power station equipment. Moreover, the advantages of a comprehensive contract including erection are here apparent. Ventilation, of both switchgear and transformer chambers, was now receiving more attention and for the former, relative humidity is the criterion for switching on heaters since dampness and not cold causes insulation failure.

Civil Engineering

Of the civil work, there is no need to follow the Victorian tradition of high ceilings, although it must be remembered that the minimum height prescribed by regulation is 7 ft. Roofs of concrete are preferable; a little care in design can result in a good appearance. The important consideration here is the present high cost of civil works. From the exterior, appearance can be aided by trees, especially if tree removal is kept to a minimum. Reasonable requests to harmonise a substation with its surroundings can usually be met and the sometimes ridiculous planning impositions for camouflaging substations now seem to be extinct.

In the same sense, this may now be a more enlightened age regarding substation siting and effects on local amenities. Quite apart from the sensibilities most engineers have for preserving the beauties of the countryside, it must not be forgotten that a supply of electricity itself is an important amenity.

When planning cable entries, there are two ideals, to make the cable route out of the substation as short as possible, and to keep it separate from other cables. This requires separate cable pipes or individual cable slots, but in those cases where cable trenches are necessary, even then it is not difficult to segregate main from distribution cables, with trench covers lightly grouted in, and oil-sealing methods employed.

For small distribution substations, the steel kiosk, with its many disadvantages, has now given way to prefabricated structures using pre-cast concrete but, with even the smallest building costing £500 to £600, the greatest advance has been the extension of use of the outdoor 11 kV substation. This caters for a 500 kVA transformer with fuse protection, and many combinations are possible, the only real disadvantage being limitations due to lack of h.v. circuit-breaker. Factors in favour of its extended use lie in improved h.v. isolators and fuses, universal use of outdoor transformers as standard, and quite ready acceptance of the design by local authorities. Being of small cubic capacity, it is exempt from planning permission. It is estimated that if an Area Board erect 100 substations a year, a saving of £40,000 to £50,000 in civil costs can be effected.

When considering 33 kV and 66 kV substations, much depends on the site conditions—an open country permitting a sound symmetrical design to be used. In the smaller installations it is usually possible to arrange a direct overhead lead-in from the line but the larger installation almost invariably requires cable terminations, despite their cost and additional hazard. One of the designs effecting a real saving is the back-to-back arrangement used at Lewes 132/33 kV Grid Intake point, employing a central sectionalised busbar with circuits branching forth on either side.

In conclusion, Mr Fuller ventured to forecast, envisaging the universal use of grain-orientated, cold rolled steel in transformers, together with the extended use of silicone insulation. Solid or semi-solid connection of transformers, without fuses or c.b.s is also likely to increase, with much greater use of 33 kV as a distribution pressure. Switchgear at the same voltage will probably be simplified, and, especially, control gear reduced, whilst the number of indicating instruments is also likely to fall. Less 33 kV c.b.'s are likely to be used, this trend accompanied by the develop-

Switchgear breakdown due to vermin—a common trouble in the early design of cellular or cubicle switchgear

ment of air or oil break fault making, load-breaking switches. The extended use of integral substations of 11 kV transformers incorporating h.v. and l.v. fuse gear in the tank, as national standards, is also likely, whilst 200 kVA pole transformers should become commonplace.

From the design of distribution substations, attention is turned to the broader subject of "Problems and Progress in Electricity Distribution," the title of the address given by Major E. N. Cunliffe, B.SC.(TECH.), M.I.E.E., A.M.I.MECH.E., of the Belfast Corporation Electricity Department, who is this year's Chairman of the Northern Ireland Centre. In contrast, however, to the practice of selecting one particular aspect of the subject, he chose to highlight random examples illustrating problems in distribution and methods of overcoming them.

The first problem encountered is that of system design and planning, since demand, at present, doubles every decade. It is, however, not only necessary to consider by how much the demand will increase, but where it is likely to arise. Any foreknowledge of the probable direction of future development, will quite often justify burying more copper, using a higher distribution voltage, or laying the foundation of a system more elaborate in the first instance than might appear appropriate. This naturally has conditioned the development of supply in Belfast, and since the commissioning of the first 33 kV cables 20 years ago, it has now been necessary to carry out extensive reinforcement, with the use, latterly, of the still higher transmission voltage of 110 kV.

System Operation

Of equal importance to planning and design is the more practical side of construction, operation and maintenance of the distribution system. In this work, the best way of assessing the relative importance of the diversity of problems which are met is to study the circumstances which give rise to supply failures. Accordingly, a detailed analysis of all important faults on the Belfast System has been made during the past four years. The work shows that the incidence of faults is purely random, whilst there is such wide fluctuation in the moving annual totals that it is impossible to say whether reduction in fault incidence is being obtained during this period. It does appear, however, that faults tend to occur in batches, lending support to the view that one really heavy fault can produce voltage surges to weaken still further points of potential failure.

A further study of the same faults shows that switchgear, including control and protective gear, is involved in 62% of the total faults, whilst cables and overhead lines account for 32%. Transformer and other converting plant is comparatively trouble free, contributing to some 6%. Of causes of faults, mechanical deterioration is responsible for 24%, illustrating, incidentally, the importance of mechanical training and experience in the Supply Engineer's training. Faulty design, workmanship and mistakes account for 27% of all faults.

More detailed inspection of switchgear troubles indicates fuses and mechanisms to have the least reliable features accounting for 32% and 36% of faults, respectively. Of causes, mechanical deterioration is responsible in 39% of all cases, faulty workmanship and design accounted for 20%, mistakes 9%, electrical deterioration 8%, and non-discrimination 10%. On the other hand, there is, perhaps, no other field in which designers and manufacturers have made such progress as in switchgear. As one example, the need to exclude vermin and to have proper interlocks controlling access to live conductors prompted the development of the now universally accepted metal-clad switchgear. Another example is the introduction of the arc control pot to improve o.c.b. ratings.

Electrical Engineer in Mining

By way of contrast, the Address to the Western Centre had mining electrical engineering as its subject, the Chairman, T. G. Dash, M.I.E.E., M.I.MECH.E., M.INST.M.E., coming from the S.W. Division of the N.C.B. This subject, moreover, is not frequently met in the I.E.E., the speaker pointing out that despite the extensive use of electrical power, and the large number of electrical engineers employed, in the industry, few possess the necessary qualifications for membership of the Institution. This situation has been brought about largely because working conditions have been far from congenial. Salaries did not compare with those of other industries, whilst the status of the electrical engineer in the industry was not so high as it is today.

Since nationalisation conditions have steadily, if slowly, been improving. Dusty atmospheres at the coal face are being reduced by water infusion and the wet cutting of coal. The siting of plant is now more conditioned by the need for access for maintenance. Both salaries and status have improved, the former bearing comparison with those obtaining elsewhere. Moreover, progress has been made towards improved ventilation and thus removing concentrations of gas to make mines safe for electricity rather than require apparatus perfect in construction.

Although the Mining Industry pioneered a number of electrical developments—it was the first to utilise a 33 kV distribution system with plant using steam at 350 lb/sq in., 750° F—much of it was either unable or unwilling to avail itself of the advantages that electricity could offer. In the last decade, however, and particularly since nationalisation, remarkable advances have been made, especially in the use of electricity for coal mining and underground conveying. With this advance has come a large amount of new electrical equipment, much of it flameproof, installed for the first time. This, in turn, has created a growing demand for trained electrical engineers, whilst the attitudes of mind of many of the original electrical staff has changed as they become increasingly concerned with all aspects of underground work.

Ethics of Engineering

Whereas the foregoing Addresses have had, primarily, engineering developments as their basic theme, the North Western Centre chairman, G. V. Sadler, M.I.E.E., chose as his theme the ethical aspects of electrical engineering progression. Although the duties consequent upon membership of the Institution are known well enough, the responsibilities are less well understood. The pace of engineering development today is such that engineers involved in its multiplicity of details have little time to sit back and consider its impact on other people, on less-developed nations and even on the present conflict of ideologies. It is vital for engineers to measure the progress of their work by some known standard, and take notice of these measurements, or eventually it will engulf them by creating problems impossible of solution by their own technology.

Such progress can be measured, of course, in material terms, but this is not a measure of the progress of civilisation, the only kind of progress which counts. Civilisation itself is here defined more precisely as Christian civilisation, and progress as a gradual refining of human nature. The importance of the religious aspect is emphasised, since religious influence has been most marked among the people of a nation at times of real moral and material progress. One of the possible future roles of the engineer is in husbanding the material resources to prevent waste, in contrast to the manufacture of products designed only to last a few years. In taking technology to the under-developed countries, the engineer may become an electrical missionary, teaching the way to live as well as work.

notes on wiring

by Megohm

I WONDER just how many people noted there was recently an "Industrial Safety Week"? Normally the theme for "Safety Week," which is organised by the Royal Society for the Prevention of Accidents, is centred on the operative with the accent on the use of proper safety equipment, etc., but this year's campaign has been more general. More attention has been given to encourage the young worker to develop safety habits which will serve him or her for years to come. During the last few years certain safety posters have been issued which dealt with the electrical side of industry. One of these, which I considered to be very good, showed a monkey playing around with some wires and a switch. The caption read "Don't Monkey with Electrical Fittings." I think the poster worthy of a place in every building where electricity is used.

I have for some time now pressed for a safety campaign in the home. I also feel that fatal accidents due to electricity should be more fully and clearly reported in the daily newspapers. When we read about such an accident, little real information is given by the Press and consequently the matter is soon forgotten. On the other hand, certain people who read the report are very often afraid to use a piece of apparatus similar to that which was blamed for the accident. I have had personal experience of such a thing, and it took me quite a long time to convince the person concerned that the accident had been caused through negligence and bad maintenance. The fact that people can be affected in this way shows that the matter of educating the user of domestic appliances must be pursued in a vigorous manner. I realise that much time and money would be involved in such a campaign, but I feel the results would be well worth while.

Meter Alarm Bells

I read a letter in a newspaper recently which to my mind was a plea which the electrical manufacturer of house meters would do well to answer. It came from an aged person who wondered if it were possible to fit an alarm bell to his prepayment meter which would ring when his shillingsworth of electricity was nearing its end. I could readily sympathise with his reason. He pointed out that his meter was in a most awkward position under the stairs and a good deal of manipulation on his rather stiff limbs was needed to reach the slot where the shilling was inserted. His last paragraph to the effect that he had often to hang on to his last shilling in the hope that the light would last and he could spend the money the next day, drove his point home with real emphasis. I do not know if such an arrangement can be obtained, but there is certainly a need for it. Many householders have, and prefer, a meter which must be paid before it gives the needed light and power. Many householders, too many in point of fact, have meter and fuses in inaccessible places.

There is no need for such a stupid arrangement. We are no longer faced with having to use an ugly switchfuse and fuseboards and the modern consumer's units are such that they do not offend even the most critical eye. Of course, care and good sense must be used by the planner and the installer. It is no use whatsoever if the planner sites the unit in a position he considers is correct and then finds that the supply authority requires extra payment for the length of supply cable involved. I feel that some revision of the type of cable used for the supply to a house is necessary. I have heard many bitter remarks about the underground cable which is normally used.

I appear to have strayed from my original theme of meter alarm bells but the whole matter is closely related, so perhaps I may be forgiven. I do feel due consideration should be given to the problem and some attempt made to help such people as the person who, in my opinion, has a real axe to grind.

Boxes for Partition Walls

Following my remarks in connection with the above mentioned boxes, I received a letter from the manufacturers on the matter. They inform me that they have now small stocks of these boxes of the adjustable grid type, also similar boxes having switch fixing lugs in accordance with B.S.1299. The adjustable grid box has fixing holes at $1\frac{1}{8}$ in. centres, and can be used for 5 amp, 3-pin sockets, bell pushes, etc. The box with B.S.1299 type fixing lugs can, of course. be used with 13 amp sockets, switch sockets and 5 amp, 3-pin switch sockets. Production is going ahead on 2-gang and 3-gang adjustable grid type boxes, but it may be some weeks before these can be made available for delivery from stock.

I also received a sample of the box set into a piece of plaster-board and a list of instructions. The instructions are very clear and the whole method of fixing one of these boxes is simplicity itself. Due care must be given to ensure that no damage is caused to the board itself. The sample box is extremely well made and is much better than the original one which attracted my attention some months ago. The fact that a manufacturer has seen the need for such an article shows the initiative that one likes to see in a healthy industry.

Infra-Red Heaters

I note that infra-red heaters are becoming popular not only in farming circles but in the dog-breeding world. Farmers know the advantage of these heaters in cutting down losses in their piglets and chickens, and a well-known dog breeder has also proved their worth. This friend of mine had some trouble with a litter of puppies who were refused the natural warmth by the mother, and she called in a local farmer who suggested a heater. The heater in question cost 23s. 6d. including the lamp. A good quality porcelain holder is incorporated in the unit which has a 10 in. reflector. A replacement lamp cost 8s. 3d. plus 1s. 5d. purchase tax. When I looked in at the pups in question they appeared to enjoy the warmth from the lamp, and the mother the fact that she was able to curl up in her own well accustomed manner.

High Voltage Research

Modified Van de Graaf generator used to determine calibration points on h.v. scale

CALIBRATION of the high votlage scale has taken the form of determining resonances in the gamma ray emission from targets of a specific element when that target has been subjected to bombardment by a beam of protons. By deflecting the beam electrostatically in an analyser, knowledge of the potential of the electrical field required for deflection enables the beam energy to be determined, this in turning, giving the voltage employed to accelerate the beam initially. It is thus possible to equate a given emission resonance with a definite voltage, providing a definite calibration point on the high voltage scale.

This work has received comparatively little study, whilst most attention has been given to the first strong gamma resonance in fluorine, which computed at 873·5 ± 0·9 keV, has been used as a calibration point by a number of workers. To provide a check on this high voltage scale so established, a further analysis has been undertaken and the work involved formed the subject of two papers presented to the I.E.E. Measurement and Control section last week.

Before describing the analyser used, however, it is necessary to consider the means by which the required proton beam was accelerated. To produce the accelerating voltage, a pressurised generator of the charged belt type was constructed, its design based on the Van de Graaf generator but having many mechanical details in common with the generator developed at the A.E.R.E., Harwell. A feature, moreover, is the improved electrostatic design which employs guard rings elliptical in section, rather than circular, to reduce the radial field.

Detailed in the paper by D. R. Chick, M.SC., B.SC., M.I.E.E., and D. P. R. Petrie, M.SC., the generator comprises basically the vertical belt, driven by two 10 h.p. motors, and the accelerator tube, both enclosed in a generator column and associated guard rings and the whole mounted within a pressurised chamber. The generator column comprises metal plates of aluminium-silicon alloy supported on and insulated from each other by three insulator pillars. Each pillar is built up from a series of 2½ in. long insulators screwed end to end and made from "Perspex" cemented to brass end caps using "Bakelite" vinyl cement. End caps were re-machined after cementing to ensure correct lengths so that, when assembled, the overall heights of the pillars showed a variation of less than 0·004 in. between them in a height of 9 ft.

Each plate contains two apertures, one rectangular for the vertical runs of the belt and the other circular, containing the accelerator tube. Four belt guides are fitted, each of ¾ in. dia. "Perspex" rod having a ⅜ in. glass spacer rod cemented into its face. A resistance stack running from top to bottom between the vertical belt runs, comprises 44 separate units connecting the plates together, each unit consisting of 37, 20 megohm composition resistors.

Two designs of tube were developed, the first being made up of 43 porcelain rings of 10 in. internal diameter separated by steel diaphragms to which the electrodes are clamped, the whole sealed with cold setting "Araldite" cement: Electrodes in this design were of aluminium being suitably "dished" to protect the tube wall from direct exposure to the beam. However, damage sustained by the aluminium and affecting other parts of the tube, which ultimately led to flashover, necessitated stainless steel electrodes to be employed, whilst the "dish" of each was inverted to protect the porcelain from any metal volatilised from the metal surface. Each electrode is metallically connected to its corresponding generator plate, whilst the two uppermost electrodes, used for beam focusing, were connected to a 0-40 kV power supply unit mounted in the top terminal. Keyed to each generator plate is a guard ring of either 42 in. or 35 in. dia, the dia of the column changing some halfway up its height, the plates in this section being correspondingly smaller. Surmounting the stack of plates and rings was the terminal shield, whilst mounted on the larger diameter rings at the point of reduction is a further intershield. Although the pressure vessel was designed for 400 lb/sq in., the gas normally used—dry nitrogen with 10% by volume of Freon—was kept at a pressure of about 150 lb/sq in.

The analyser described by S. E. Hunt, PH.D., D. P. R. Petrie, M.SC., K. Firth, B.SC., and A. J. Trott, comprised two adjacent low-carbon steel bars as the electrodes, 2·5 in. by 1·5 in., shaped in the arc of a circle so that the geometric mean of the radii of their inner surfaces is 36 in. whilst their mean separation is 0·375 in. approximately. Each is mounted on, but insulated from, a base-plate of a mild steel casting. In contrast to the analyser used by earlier workers, in which a deflecting angle of 90° was used, this instrument employed an angle of 63·2° in order to focus the parallel incident beam on to a fine exit slit. It was provided with a ±50 kV supply for deflection, employing a stabilising circuit having eight thermostatically controlled standard cells.

Control Mechanism for Thermal Reactor

AN actuating mechanism for combined control and shut-off rods of a thermal reactor is shown in the adjoining photograph. The mechanism is designed to provide a slow "out" and two faster "in" speeds, and to hold the rod in any required position. It is also capable of giving a controlled shut-off of the reactor independently of the electrical supply.

The mechanism consists of a synchronous control torque motor, fed from a variable frequency supply, driving through a 20 : 1 reduction gear on to a cable reel. The speed of the rods to the shut-off condition is controlled by a permanent magnet eddy current brake. Rod position indication is given by a geared magslip transmitter. The entire mechanism is dry lubricated by molybdenum disulphide.

Metropolitan-Vickers Electrical Co., Ltd., are supplying 120 of these mechanisms for the Calder "A" power station of the United Kingdom Atomic Energy Authority.

Actuating mechanism for nuclear reactor control rods at Calder Hall

A Combined Rope and Multicore Cable

SPECIAL DESIGN ASSISTS UNDERWATER TELEVISION

SUCCESSFUL trials were recently held on the lake at Zurich, Switzerland, using an underwater television camera fitted with a specially designed multi-core signal cable which also acts as a lifting rope. The trials were carried out by Pye Ltd.

The tests showed that by using this type of cable the time taken to sink and lift an underwater camera can be much reduced. For instance, lowering a camera to the 400-500 ft depth usually takes about 45 minutes whereas the new cable enables this to be done in 2 minutes. This great reduction is due to the absence of the usual wire hawser which makes a slow descent imperative because of the danger of its fouling the electric cable.

Manufacture and Construction

The new combined lifting rope and cable used was manufactured in one length of 1,000 ft by British Insulated Callender's Cables Ltd. It is a double plastic sheathed version of a standard polythene insulated multi-unit television camera cable with a loom woven textile finish of hemp as a final covering. This special interlocking weave provides extremely high tensile strength combined with flexibility and resistance to abrasion. It cannot fray or run loose, and owing to the individual threads being parallel with the axis of the cable there is no undue strain on the cables cores. The loom braid is clamped to the camera coupler and thus provides the necessary strength for lifting the camera.

For the purposes of the trials the underwater camera was connected to the cable by means of an underwater coupler developed jointly by Pye Ltd. and B.I.C.C. Ltd., the cable passing over a pulley of approximately 1 ft diameter and from there to a capstan of the same diameter. The cable was then flaked on to the deck of the boat in a figure-8 formation to avoid twisting, and connected to the viewing unit and ancillary equipment. The camera was lowered by allowing the cable to slip round the capstan at the rate of approximately 250 ft a minute for 2 minutes and this was repeated many times. This was a severe test for the cable as the diameters of both capstan and pulleys were smaller than that normally recommended for this size of cable. The rubbing of the hemp finish on the capstan was also a severe test of the durability of the cable. At the same rate of lowering the camera into the water many depths around 150/250 ft were explored.

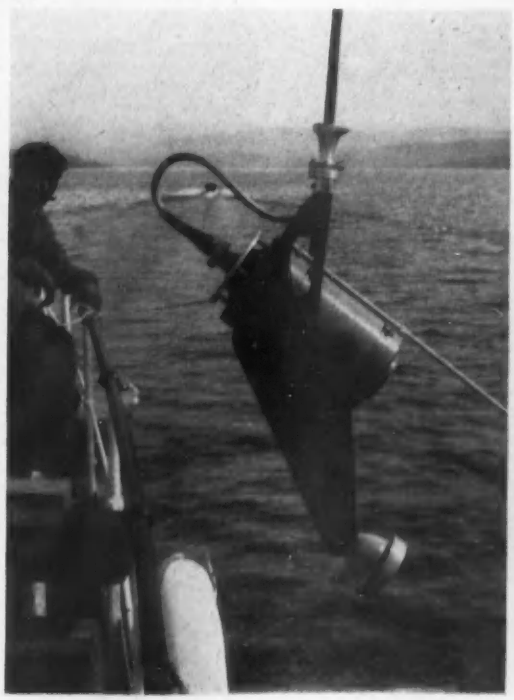
At all depths the cable resisted any twisting action and allowed the camera to remain in a fixed position indefinitely. Whilst some wear was noticeable after three days of trials this was not considered unsatisfactory as the woven hemp finish had no protective covering. No electrical failures occurred and even after winding at high speed over small diameter pulleys the circuits were all intact.

Performance

The cable supported the weight of the camera (approximately 2¼ cwt) for long intervals above the surface of the water without showing signs of stretching and whilst the woven hemp finish tightened up on the p.v.c. sheath when in the water, no damage to the sheath occurred.

Additional tests included lifting the camera twenty feet in the air and allowing it to drop near the surface of the water, the whole strain being taken by the cable. No electrical failures occurred in the cable nor did the textile finish show signs of stretching or fracture.

At one time the camera was towed 100/200 ft behind the boat at a speed of approximately 12 knots and again the cable stood the test well. Pye Ltd. are ordering a number of lengths of this type of B.I.C.C. cable which has greatly simplified the handling of underwater cameras, although even further improvements have been suggested as a result of the trials.



3 CO-AXIAL UNITS OF 75 OHMS CHARACTERISTIC IMPEDENCE
3 TRIPLETS OF 022 INCH WIRES POLYTHENE INSULATED
TINNED COPPER WIRE BRAID
21 SINGLE 036 INCH WIRES POLYTHENE INSULATED
TINNED COPPER WIRE BRAID
DOUBLE PVC SHEATH
LOOM WOVEN HEMP
OVERALL DIAMETER OF CABLE = 1.32 INCHES

The underwater television camera suspended from the new cable, and a cutaway photograph of the cable to show inner arrangement

BRITAIN'S PREMIER FOOTBALL STADIUM INAUGURATES ITS FIRST PERMANENT FLOODLIGHTING INSTALLATION

Switch-on at Wembley

WEDNESDAY of last week saw the first public football match—London v. Frankfurt—to be played under Wembley Stadium's new permanent floodlighting scheme. Installed at a cost of £22,000, the new scheme was planned and supplied by the General Electric Co., Ltd., after extensive trials with alternative systems. The outcome was the present tower system employing eight towers in all, mounted on the roof of each of the two stands, which having an installed loading of 340 kW, is claimed to be the largest installation of its kind in the country.

Combining four distinct optical systems, the installation employs 192 fittings, 24 on each tower, which is 100 ft above the playing level. Since the towers are mounted on the stands, the load bearing qualities of the roof was the predominant factor in determining the tower height. The four optical systems comprise, firstly, 60 narrow beam symmetrical systems using 1·5 kW "Osram" projector lamps, 72 medium angle distribution units, and 44 wide angle units, each using 1·5 kW g.l.s. lamps. The fourth component comprises 16 wide angle asymmetrical fittings employing 2 kW horizon type line filament lamps, four along each top row of the two pairs of central towers. These fittings provide a fan-shaped spread of light with a 2° cut-off which, whilst illuminating the players at the far side of the field, does not cause glare in the nearby spectator's eyes. The optical design is aimed at ensuring a uniform illumination over the field even with the four towers down one side switched off.

The circuit itself is contactor controlled and a feature is the use of expanded metal resistors in each of the four main feeders. Before play begins, and during half-time, the resistors are connected in circuit to reduce the lamp voltage to 185 V. As the players enter the stadium, the resistors are short-circuited by remote control to raise the lamps to full brightness, similar in effect to that of stage lighting when the curtain goes up. As a visit to the stadium for the London v Frankfurt match showed, the lighting is such that spectators can see virtually every detail of play, and from the players' point of view is excellent.

Aligning each unit at Wembley was effected using a remote indicating photometer and walkie-talkie equipment. On the right, lamp focusing in progress. The engineer uses a special template

Production and distribution of Dairy produce

DAIRY SHOW AT OLYMPIA RECORDS CONTINUED PROGRESS

REGARDED throughout the country as the principal shop window for Britain's dairy industry, the Dairy Show, organised by the British Dairy Farmers Association, was in session last week for the sixty-ninth time.

Naturally the livestock exhibits, which include cattle, goats, poultry, pigeons and rabbits; and the produce competitions form a most important part of the show, but the machinery and equipment featured now forms a section of increasing importance. The very latest in dairy and ice-cream equipment shown, covering the producing, distributive and processing sides of the industry, includes exhibits entered for the silver and bronze medals offered each year for appliances showing distinct and practical improvement especially on the saving of labour.

It is relevant to this theme to consider the applications of electricity on a dairy farm having a herd of 30 cows which were demonstrated on the E.D.A. Stand.

For this display it was assumed that on the farm full use was made of the electricity service and that the bucket milking system was employed. On display were electric appliances for water heating, steam raising and chilled water milk cooling. These included a Prestcold chilled water unit, a Woolley water heater and Woolley steam steriliser, a Martin's Comet mill and a Holland vertical mixer for animal food preparation.

Separate displays showed infra-red heaters, both bright and dull emitters, for the successful rearing of chicks, piglets and calves, while the use of electricity in ensuring an adequate farm water supply was stressed by a display of sectional models of electric water pumps, both of the submersible and piston types. A selection of well glass, corrosion resisting and other lighting fittings suitable for both filament and fluorescent lamps completed the display.

On the Dairy Farm

Wolseley Engineering Ltd. reserved for the show the introduction of six new items of electric fencing equipment. There were two new pattern pigtail posts (EF951 and 947) which have an improved insulated section. This portion now uses rigid p.v.c. material sufficiently strong to hold the fencer wire without needing a metal core, yet it is not brittle. The p.v.c. material is bonded to the top of the post and as the pigtail curl is not internally supported, shorting is eliminated. The new mains fencer control panel has been developed to meet the requirements of the farmer who uses one mains fencer to energise several circuits. It enables each circuit to be checked individually and collectively by means of the Wolseley shock tester (reported recently in these pages). It also allows any faulty fence to be disconnected from the general circuit, which is essential when several lines are in use. A moulded bobbin now replaces the plastic tube which has previously acted as the insulated material on the catswhisker insulator. The pigtail insulator part of the latest pigtail post is also available for angle iron and wooden posts. R. A. Lister made a feature of motive power units and electric lighting and power plants for farms and dairies not yet supplied by mains electricity. The i.c. engines included the latest LD air-cooled 1½-3½ horse power and TS3 water cooled 77 h.p. diesels. The lighting and power plants included a 40 kW alternator set, using the TS3 engine. Other items included examples of Lister pumps, clipping and shearing machines, electric cream separators and milk coolers. Geo. W. King's display at the show included a range of their electric hoists.

Gascoignes (Reading) Electronic milking control system, the introduction of which we noted in our review of the Royal Show this year, gained a bronze medal.

Purlac Equipment emphasised the compactness of their 1956 milk cooler and tank combined, the prototype of which was on show. This, say the firm, will enable the farmer to milk straight into the tank, cool the milk as it comes off the bucket and store for any length of time he requires. This has been evolved in view of the bulk collecting scheme now being studied at home and abroad. Purlac stress another advantage of their unit. Its immediate use by farmers who do their own bottling will save considerable work in handling churns and enable the farmer to ensure that the milk is being kept clean and cool.

Dairy Machines and Equipment

The Prestcold display consisted of a comprehensive range of refrigeration equipment associated with the dairy industry. Special emphasis had been placed on the Prestcold low temperature unit cooler and automatic de-frost system which was arranged in a 150 cu ft display coldroom. Other features included an exhibit of a Prestcold CWH. 110 unit cooler with hermetic unit and a central exhibit concerned with the bulk milk collection scheme.

The A.P.V. Co. had an item illustrating automation in the dairy. This was the "Lanfers" milk reception unit by means of which all the processes—conveying, emptying, weighing, washing and sterilising the churns, sampling milk—are done without human handling, except by one man operating electronic controls.

Fords (Finsbury) had a new "Synchro-Print" bottle capping machine which used pre-printed Synchro-foil without perforations and registers cap-making with the printed design by means of an electronic scanner. With an output of 12,000 bottles per hour this machine won a silver medal and first prize in its class.

The Perpetual challenge trophy presented by Mr Arthur Guy Enock for the best exhibit in the new invention class

The E.D.A. exhibit at Olympia

relating to the distributive side of the Dairy Industry, went to U. D. Engineering Co. for their Mk. III crating and decrating machines. These had been in continuous operation throughout the show and had by Wednesday night handled 300,125 bottles. This exhibit also gained a silver medal.

Rose Bros. (Gainsborough) Ltd. were awarded a silver medal for their New Era direct flow ice cream packaging machine which has an output of 130 per minute. One particular feature of Cockx and Sons' display was for their new Hall "in-crate" bottle washer. C.W.S. dairy equipment works had a churn washer of completely new design. This handle 10 churns per minute.

The Dairy Supply Co.'s new curd cooling and salting machine for cheese production, which sells at £750 and employs overhead agitating and cutting gear powered by electric motors, was awarded a silver medal in the new inventions competition and in the same class J. W. Woolley and Co.'s "Washilizer," a water heater, a boiling water steriliser and/or steam steriliser at £35 was awarded a bronze medal. Woolley's also gained a silver medal in a different class for their new 5 cwt dry food meal mixer.

A striking introduction by the refrigeration division of Hawson Ltd. was their lightweight portable cold storage room which could be erected by anyone in under 2 hours. It is constructed of 7 ft x 7 ft insulated sections, each weighing 85 lb. Fitted inside it is a hermetically sealed f.h.p. compressor using less than one unit per hour which is preset to maintain any required temperature.

Delivery of Milk and Produce

Smiths' Delivery Vehicles showed their larger models which incorporated many detail improvements. Their one ton Smith N.C.B. Dairy truck had been fitted with the special grocery display compartment at the rear of the vehicle which is the answer to several requests, mainly from South of England dairymen who take out a selection of produce with their milk deliveries. The 30-cwt model shown has detachable cab doors, rubber buffers at the rear, rubbing rails at the sides, aluminium alloy flooring on the loading deck and aluminium chequer plate in the cab. The 2 ton truck in addition had sliding cab doors.

Batteries for electric dairy vehicles were a feature of the Tudor Accumulator Co.'s display, which included a range of Tudor batteries designed to meet the arduous nature of a seven-day delivery service and the heavy work encountered by fork lift and platform trucks. An additional display shows a range of open and sealed cells used by farms for lighting and power. D.P. Battery Co. had a similar display of "Kathanode" batteries.

A range of chargers specially designed for the nightly recharge of such traction batteries was the principal feature of the Westinghouse Brake and Signal Co.'s display. The design of chargers supplied to the milk industry has been studied in conjunction with the battery manufacturers to ensure adequate stabilisation against fluctuations in mains supplies. The design of the casing has been evolved to give trouble-free charger service in semi-exposed positions.

Diamond Motors (Wolverhampton), makers of Graiseley Electric Vehicles, featured their G.90 milk pram (46 crate capacity) which sells at £385. 5s. complete, including battery and charger and their G.60 (30 crate capacity) model which similarly sells at £298. 8s. whilst Austin Crompton Parkinson Electric Vehicles showed a new 20 cwt dairy vehicle (part of an order for 100) which has a new safety vision cab with wide side openings. The vehicle has a narrow mirror running right across the top of the windscreen which enables the driver to see any children or animals playing immediately in front of the cab.

Wales and Edwards had two 25 cwt vehicles (of the three-wheel type) for milk distribution shown in the liveries of two principal operators in London and Birmingham. One embodied a new type Fibre glass cab.

Helecs Vehicles showed their 90 gallon 4-wheel driven vehicle which incorporated the "Elexmatic Pack"—a 1953 Silver medal winner.

Farm Electrification Costs

LAST week, the S.W. Electricity Board held their first lecture devoted to electricity for farming at the Seale-Hayne agricultural college, Newton Abbot. Delivered by Prof H. G. Sanders, chief scientific and agricultural adviser to the Ministry of Agriculture, this inaugural lecture was entitled, "Electricity and Efficient Farming." The decision to establish an annual event of this nature was due to the recent retirement of Mr G. Johnson who had served as a part-time member of the Board since its formation in 1948. It was felt by the Board that this annual event, known as the "George Johnson Lecture" would form a satisfactory method of perpetuating Mr Johnson's work relating to rural electrification in the South West.

In his address, Prof Sanders stressed the cost of connecting rural consumers to the supply and indicated that fair comparisons could not be made with urban areas owing to the difference in consumer concentration. In urban areas it is common to have approximately 200 consumers per mile of main, whereas in the country the figure may be only 10, and of those the majority will be cottagers. The cost of connection depends on the distance from existing mains and may be as high as £1,000, although a more average figure for farms is approximately £350. When the lines have been erected there are continuing charges to be met and experience has shown that these total an annual charge of about 11% of the initial cost. This money must come from the sale of current to the new consumer but of that revenue only one-third is available to the area board, the other two-thirds being the cost of buying current from the Grid. If the charges are to be met from the sale of current, the annual revenue from the new consumer must be in the region of 33% of the cost of connection.

Fortunately, the demands by different classes of consumers are diverse which helps to even out the peak demands on the system. This enables more reasonable terms to be offered, encouraging farmers to install electricity at a lower initial percentage return on farm connections, a figure of 20% and occasionally even less is accepted by some Boards. Nevertheless, if this 20% is applied to the £350 average cost of connection, £70 becomes the minimum annual revenue to be derived from the newly connected farmer, if the Board expects to be repaid in the long term. So large a revenue is unlikely to accrue, since taking the whole country, the average figure per farm is £31 and in the South West only £27. Thus, if the farmer undertakes to pay a minimum annual figure of £70, a considerable amount of current is paid for but not used. Eventually, of course, full utilisation occurs, but on most newly connected farms this develops only slowly since additional capital expenditure for new equipment becomes necessary. Other systems of connection costing are employed, but the obvious method to overcome the high initial cost is for the farmer to make the maximum economic use of electricity. As Prof Sanders states, a continued and intensified education campaign is required by area boards working in conjunction with the National Agricultural Advisory Service.

Electronic Control of a Large Paper Mill

SYSTEM USES ELECTRONIC AND MAGNETIC AMPLIFIERS TO CO-ORDINATE INDIVIDUAL SECTIONAL MOTORS

AN electronic drive supplied by Metropolitan-Vickers Electrical Co., Ltd., has been put into successful operation on No. 8 paper machine at the Papermakers Ltd. mill of Associated Pulp and Paper Mills Pty. Ltd., Burnie, Tasmania. Known as the "Metrolock," this is the first of two such drives for paper machines manufactured by Bertrams Ltd., Sciennes, Edinburgh, for installation at this mill. They are designed to make fine writing papers—wood-free banks and bonds—from both soft and hard wood pulp, and to run at 1,000 ft/min. No. 8 machine now in commission (Fig. 2) has a trim width of 120 in. and a maximum output of 40 tons per day, the drive being arranged meantime for a maximum speed of 825 ft/min. it comprises nine sections of powers ranging from 17 to 75 h.p.. No. 9 machine, soon to be erected, has thirteen sections of similar powers.

The section motors (Fig. 1) are supplied from their own individual generators, the fields of which are controlled by magnetic amplifiers. Speed control is provided on the "Metrolock" system, in which the voltage developed by a d.c. tacho-generator mounted on each section motor is compared with a reference signal from a master speed control, and the difference is electronically amplified and applied to control the magnetic amplifier. A control station for each section is mounted at a convenient point.

Draw is obtained electrically— without the use of cone pulleys or variable speed gears—by simply operating a calibrated control knob mounted on the section control station. A "slack take-up" pushbutton enables slack paper between sections to be taken up without disturbing the setting of the draw control. The reel section has a tension control with over-riding speed limit, so that in the event of a paper break the reel continues to turn at a speed only slightly in excess of the normal operating speed.

Additional Controls

In addition to the controls mentioned above, the control station includes the start and stop pushbuttons for the section motor, an ammeter and voltmeter, a change-over selector switch, and manual speed control enabling the section to be run at any speed irrespective of the speeds of the remaining sections. This is a valuable feature facilitating machine maintenance and electrical testing.

The machine is protected against damage due to mechanical or electrical fault by an adjustable circuit in the amplifier, which limits the armature current and hence the torque of the motor to any predetermined value. It also eliminates teh need for accelerating contactors and heavy resistances, because the current is restricted to a safe value during starting; the contactor gear for each section is, therefore, reduced to a line contactor with overload relay and overvoltage protection.

The complete control equipment for each section is housed in a cubicle situated close to the section motor (Fig. 1); this layout simplifies installation, wiring and maintenance. The cubicles are all identical, and a further measure of standardisation is obtained by the use of three frame sizes only for section motors and three for the corresponding generators.

System Advantages

"Metrolock" control has the advantage of inherent simplicity and ease of maintenance. The magnetic amplifier eliminates the need for large consumable components, the use of light current relays is avoided, and regular checking of the amplifier is facilitated by a built in monitoring circuit, the amplifiers themselves being withdrawable and interchangeable. The "Metrolock" system thus represents another advance in sectional drives, providing greater simplification with greater flexibility at lower cost.

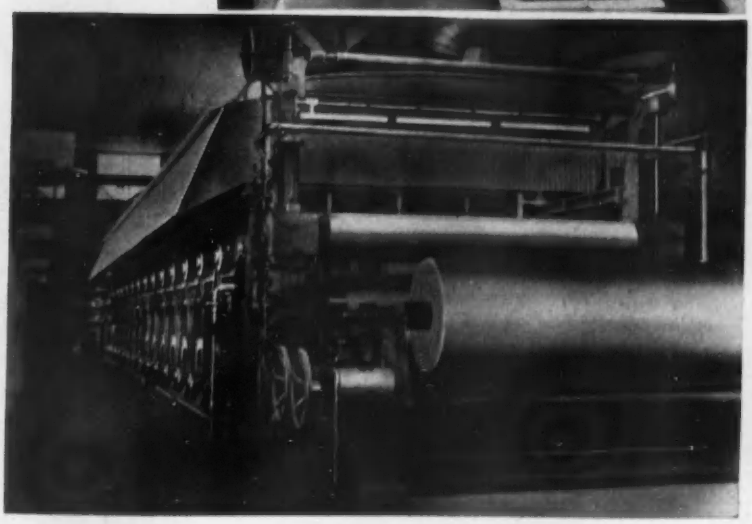
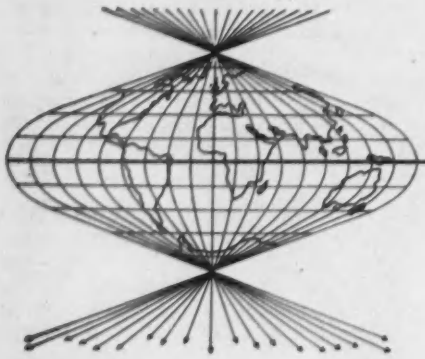


Fig. 1. Top right, the driving motors and control cubicles in the motor annex

Fig. 2. Right, general view of paper machine from the reel end to show the sections



OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Ontario Scheme

A further power development to meet the needs of North Western Ontario, has just been authorised by the Hydro-Electric Power Commission of Ontario. Under this scheme, there is to be a hydro-electric station, with a tentative capacity of 71,700 h.p. at Whitedog Falls on Winnipeg River. Preliminary work on an access road to the site—about 30 miles north west of Kenora—is now under way. Construction work should start early next year, and is scheduled to be completed by the end of 1957. The new power station will be incorporated into the H.E.P.C.'s north western division by the construction of a 115 kV transmission line to a new transformer station to be established near Kenora.

Appliance Outlook

Some appliance manufacturers estimate that at least 60 million new electrical appliances will be sold in Canada over the next ten years, Mr K. V. Farmer stated at the annual conference of the Canadian Electrical Manufacturers' Association. It is expected that replacements will make up a good portion of the figure, but if it proves accurate, the increase in the power needed to operate these new appliances will be tremendous, he went on. To meet the load the utilities will have to spend some $300 millions on apparatus. As to whether this equipment would be purchased in Canada, Mr Farmer said, "if the Industry can overcome the lack of adequate wiring, draw a more economic line on imports and maintain its foothold as a major power producer, then it can capitalise on gains already made."

Problem for Lethbridge

About $6 millions must be spent by the City of Lethbridge, Alberta, in the next 10 to 13 years for plant to meet the growing demands for electric power in the area, according to a report prepared for the civic administration by a U.S. firm of consulting engineers. The city council called for this report when it became apparent that drastic steps would have to be taken with the municipally-owned undertaking to meet the anticipated loads. Lethbridge's population has doubled to 30,000 in about 15 years and is continuing to expand at a spectacular rate. Mr B. C. Mallory, the consulting engineer who prepared the report, and Lethbridge's city manager, Mr A. L. H. Somerville, have recommended the City Council to adopt a plan calling for parallel operation of the municipal power plant with the facilities in Southern Alberta of Calgary Power Ltd. Under this plan, three 10,000 kW new sets would be installed at Lethbridge by 1969, with either system available for standby or emergency use. The first 10,000 kW generator would be ready by 1958, at a cost of about $2½ millions, a second would be added in 1963 and the third in 1969.

In the Far North

The latest Canadian power authority to face heavily increased power demands is the Northwest Territories Power Commission, which at the moment operates three comparatively small generating plants. These are a 8,350 h.p. plant on Snare River, a 3,000 h.p. development on Marjo River and a 520 h.p. diesel plant at Fort Smith. A further machine is being installed at the latter station this year, but in the other territories in far north of Canada served by the Commission the increased demand is creating difficult load problems, according to the Commission's report for 1954. It would seem that additional generating plant will shortly be required, particularly at Snare River, an expanding mining area.

BOLIVIA

H.E. Scheme

Proposal for a 70 MW hydro-electric power development on the River Negro have been put forward to the Government of Bolivia. The station, to be constructed about 27 km from Montepuncu, would operate on a head of 900 metres. It would supply the town of Cochabamba and the neighbouring tin and wolfram mines, and would cost about $14 millions.

AFRICA

Congo Station

The new Zongo 1 power station in the Belgian Congo was officially inaugurated a few days ago. This hydro-electric station on the Inkisi River has two machines with a combined capacity of 21,000 kW. When fully operative the new station will not require more than the normal dry seasonal flow of water. The dam which has been erected is used as a level regulator only—there is no reserve lake. The station is built on a peninsular formed by the river with the 200 ft Zongo Falls at the apex. Plans are already being prepared for the construction of Zongo 2 power station farther down the river.

MIDDLE EAST

Sets for Tehran

Two 5,000 kW thermal power units are to be supplied to the Power Bongah Corporation of the City of Tehran Iran, by the Westinghouse Electric International Corporation of America, who have been granted an export credit of up to $780,000 by the Export-Import Bank for the purpose. The credit is also to facilitate the sale of boilers and auxiliary equipment by other U.S. suppliers. The two new generating sets will provide much needed additional power to the Municipality of Tehran.

Aswan Dam Scheme

The Egyptian Government last weekend formally signed the contract with Sir Alexander Gibb and Partners who are to act as consulting engineers for the High Aswan Dam project, which, as the result, now enters the detailed planning stage. The British company will supervise tests and prepare drawings and specifications. Practical tests and investigations as earlier recommended by five experts, have already begun, and model tests have been going on at a hydraulic laboratory. It is expected that all approach roads and railway tracks to the site of the project will be ready by July 1957—the date on which, from the technical view point, work could be started on the dam itself. The dam will create a reservoir about 400 miles long, and, subject to agreement with the Sudan authorities, will extend over 150 miles into Sudan territory. Cost of the complete hydro-electric scheme is estimated at over £210 millions, and discussions on financial assistance are already proceeding with the World Bank.

S.W. ASIA

Boiler Conversion

The completion of the change-over of the boiler plant of the Karachi Electric Supply Corporation from using imported

fuel oil to Sui gas, was recently marked by a little ceremony by the Pakistan Minister for Commerce and Industries, Mr H. I. Rahimtoola. The change-over will save foreign currency on imported fuel to the extent of about Rs.37 millions, and it is hoped that the use of Sui gas will lead to an improvement in boiler efficiency.

Inauguration of Konar Dam

The Konar dam, Bihar State, was formally inaugurated by the Prime Minister of India, Mr Nehru, a few days ago. This is an integral part of an irrigation and power scheme being undertaken by the Damodar Valley Corporation, which will also provide water for the Bokaro steam power station. The Konar is an earth and concrete dam, nearly 2½ miles long, 162 ft high from the base level and 190 ft from the lowest level of foundation. It creates a lake of over ten sq miles.

Flood Damage

Recent floods have affected electricity supplies in several parts of India. The Uhl river supply lines, in particular, suffered at least one tower in Batala being washed away, interrupting supplies between Amritsar and Dhariwal. Lahore was also cut off, but alternative supplies for all those regions were quickly obtained from the Ganguwal power house, as the repair of the Uhl river lines is likely to take some weeks.

AUSTRALIA

Fuel for Osborne

When the Osborne "B" power station, Adelaide, is completed it will be unusual in that there will be three types of fuel firing the boilers—black coal, Leigh Creek coal and residual oil. With the opening of several new oil refineries, residual oil has now become available in quantity, and at a price competitive with coal. The residual oil used sets to a jelly at 50° to 60° F. To overcome the problem of flow, steam heaters are installed at the outlets to the storage tanks to heat the oil sufficiently so that pumps can deliver it through a pipeline.

Additional Finance

A new £2m loan was launched by the State Electricity Commission of Victoria last month. Announcing the new loan, the S.E.C. chairman, Mr R. A. Hunt, said the money would be devoted to advancing the great projects designed to make Victoria the all-electric State. The loan would finance essential expansion of the Commission's power and fuel undertakings, particularly on the brown coal fields of the Latrobe Valley. During the twelve months ended June last, the Commission connected over 18,000 new consumers in country districts, including 3,000 additional farms. The generating plant programme aims at bringing the States power resources by 1962 to about 2,000 MW.

NEW ZEALAND

Future Power

Faced with the problem of meeting increasing demands for power, the Central Otago and Teviot Electric Power Boards, N.Z., must shortly decide whether to expand their own generating facilities or take a bulk supply from the State Hydro-Electric Board. The two Power Boards are at present inter-connected as far as generating plants are concerned. Their charges are also now much lower than the average for the Dominion, and it is expected that if a bulk supply is taken it will mean an increase of about 25% in tariffs. An alternative solution of the problem is probable over the next 20 years by developing the Teviot River to supply sufficient additional power until about 1965, and then by the construction of a generating plant on the Nevis River to supply enough power to last the district until about 1977. The Teviot River development would provide a further 3,600 kW at a cost of £195,000, while the Nevis River scheme would cost £750,000.

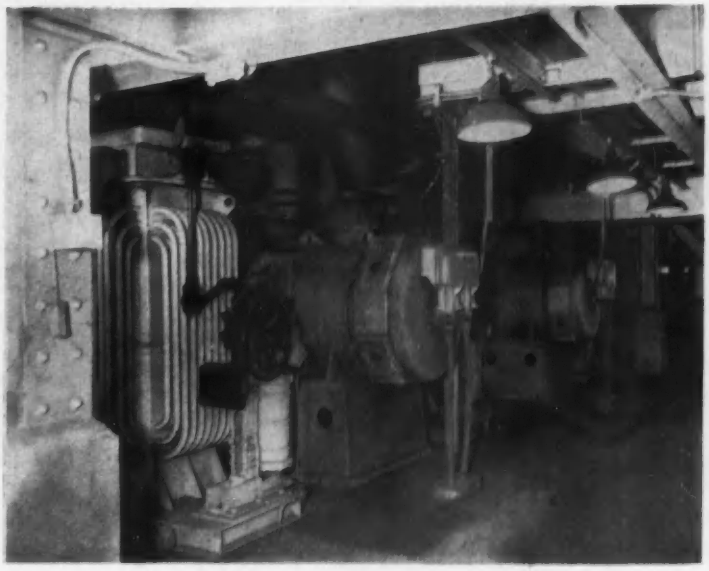
Bolstering the Gas Industry

Reports that the New Zealand Government are considering nationalising the gas industry and equating gas and electricity charges to consumers in order to save the gas industry, are being viewed with serious concern by the electricity supply authorities in the Dominion. For some years now the gas industry in New Zealand has been slowly dying it seems, and in view of the fuel position, there have been suggestions that the local electricity supply undertakings should take over plants which are proposing to close down. This suggestion has met with strong opposition, and it is now reported that the Government is considering a levy on the electricity undertakings through an increase in bulk supply costs. Mr Goosman has said he hoped that legislation designed to ensure that the gas industry would remain producing, would be introduced before the end of the current session of Parliament. Last weekend it was announced that New Zealand is to set up an electrical and gas co-ordination committee to advise the Government on steps to ensure that essential gas works are continued in operation.

JAPAN

Loan Doubt

The Japanese Government has met a setback in its application to the World Bank for a $10m loan for further power development projects, we learn. The application had been made on behalf of the semi-government concern, Japan Electric Power Development Co. for the construction of dams at Okutadami and Tagokura, in the Nigata-Fukashima Prefecture, and at Mihoro in Gifu Prefecture. An official of the World Bank, recently in Japan to audit accounts of steam-power plants seeking bank loans, revealed the decision of the bank to refrain from granting loans for the water power schemes. The reasons for the refusal are given as (*a*) existing survey reports were uncertain, (*b*) construction of two of the three dams was considered unnecessary, (*c*) construction of high cost water power plants was out of date and (*d*) the projects should be carried out by private power firms instead of the semi-government concern.



Two of the nine exhauster motors at Pyrmont "B" power station, of the Electricity Commission of New South Wales, Australia, are shown in our illustration alongside. These are N-S motors of 100/28 h.p., 1,475/970 r.p.m., which have been supplied by Laurence, Scott and Electromotors Ltd., with induction regulators operated by Bailey regulators. Pyrmont "B" power station, Sydney, comprises four 50 MW turbo-alternators each being supplied with steam from a 430 klb/hr boiler. For the plant there, Laurence, Scott and Electromotors have supplied motors to drive 9 exhausters, 9 separators and two stokers

Personalities

IN THE INDUSTRY

Newly promoted to deputy senior electrical inspector of factories, Ministry of Labour, is **Mr W. Fordham Cooper,** B.SC.(ENG.), A.K.C., M.I.E.E., A.M.I.MECH.E., who was previously H.M. electrical inspector of factories for the North and East Midlands, based at Sheffield. Mr Cooper succeeds **Mr S. J. Emerson,** A.M.I.E.E., who has been promoted to senior electrical inspector of factories in place of **Mr F. H. Mann,** M.I.E.E., who has retired, as we have already reported. Mr Cooper has been an electrical inspector with the Ministry since 1931. Earlier he was assistant to the chief engineer and general manager of the Northmet Power Co., after serving with the Yorkshire Electric Power Co. as construction engineer, and the Electrical Research Association as a switchgear research engineer. Born at Wimbledon, he was educated at King's College, London University. He is a past chairman of the I.E.E. North Midlands Centre and of the Sheffield sub-centre, and many readers will recall his critical study of interlocking devices given in a series of papers on "Electrical Control of Dangerous Machinery and Processes" presented to the I.E.E. Utilisation Section a few years ago.

We hear from Aron Electricity Meter Ltd., that **Mr Oswald Freeman,** home sales controller, has resigned and left the company. **Mr Robert Taylor** has been appointed sales controller in charge of the home and export markets. Mr Taylor has been with the company for 21 years, for the last three as export manager, during which time he has travelled extensively all over the world.

The recently formed British subsidiary of the Square D Company, one of America's largest manufacturers of electrical control gear and switchgear, is to be managed in this country by **Mr J. L. Thompson,** of Chicago, who is pictured below. Mr Thompson is no stranger to Britain since he served over here with the U.S. Forces during the war and was in fact, trained by the Royal Artillery in military radar operation. After graduating with a M.SC. degree from an American University, he joined the Square D Co. in July, 1940, and has previously held appointments as field engineer and regional sales manager of the Chicago and Middle West territory. As we have already noted, the company's London offices are at 100 Aldersgate St, E.C.1.

Philips Electrical Ltd. have appointed **Mr K. A. Bromley** as marketing manager of their Lighting Division. He will be responsible for co-ordinating the marketing activities of the product groups within the division and will assist branches and regions in giving effect to divisional sales policy. Mr Bromley joined Philips in 1948 and was branch lighting engineer at Leeds before going to Manchester in 1951 as assistant regional manager, North West Region.

Mr R. A. Henderson and **Mr J. L. E. Smith** have joined the board of the Solartron Electronic Group Ltd.

New appointments in the Sales Departments are announced by Metropolitan-Vickers Electrical Co., Ltd., as from 1 Nov. **Mr R. J. Cochran** has become sales manager, Plant Department, and **Mr J. Dyson,** B.SC.(ENG.), A.M.I.E.E., is sales manager, Transformer Department. Mr Cochran who was previously sales manager Transformer Department, since 1945, joined the company in 1929. He was educated at Rothesay Academy, Bute, and at the Royal Technical College, Glasgow. Mr J. Dyson received his technical training at the Halifax Technical College and obtained an external degree from London University. He went to M.-V. as a college apprentice in 1947, and, after a short period of special training, spent some months at the company's Hague office. In 1952 he returned to Transformer Sales Department, and was appointed assistant to sales manager, Transformer Department, in March 1954.

Mr W. B. Albright, managing director of Albright and Wilson Ltd., has been appointed vice-chairman of the company with special responsibility for overseas affairs, as from Nov. 1. He will be succeeded as managing director by **Mr S. Barratt,** who is at present a director and secretary of the company. **Mr C. N. Wilson** has been appointed secretary to take Mr Barratt's place.

Expanding their activities, Cleminson's Agencies Ltd. have appointed two new representatives—**Mr D. I. Wiggans** as area manager for Derbyshire, Leicestershire, Northants, Notts, Staffordshire, Warwickshire and Worcestershire, and **Mr A. V. Lake** to handle the South London and South Coast area.

Mr H. T. Utting, assistant branch manager at Manchester to Brown Brothers Ltd., was recently presented with a cheque from the directors at a dinner given on his retirement after 44 years service with the firm.

Sir Herbert Manzoni, C.B.E., engineer and surveyor of the city of Birmingham since 1935, has been elected chairman of the General Council of the British Standards Institution. **Sir Roger Duncalfe** has been re-elected president of B.S.I., and **Mr John Ryan,** C.B.E., M.C., vice-chairman of the Metal Box Co., was re-elected vice-president on completion of his three-year period of service as chairman of the General Council (Sir Roger Duncalfe, by the way, was recently elected president of the International Organisation for Standardisation—an office which he takes up at the beginning of 1956). The new chairman of the B.S.I. Engineering Divisional Council is **Sir Stanley Rawson** (vice-chairman of John Brown and Co., Ltd.). He succeeds **Mr S. J. Harley,** of the Coventry Gauge and Tool Co., in directing the largest individual section of B.S.I.'s work on national and international standardisation.

Mr William L. Brown has been appointed managing director of Hackbridge Cable Holdings Ltd., and also appointed to the board as director and chairman of the Hackbridge Cable Co., Ltd., and of Bryce Electric Construction Co., and as chairman of Siemens-Shuckert (Gt. Britain) Ltd.

Mr R. Taylor

Mr J. L. Thompson

Mr R. J. Cochran

Mr J. Dyson

Retiring after 48 years service in the electricity supply industry, **Mr S. D. Larcombe,** A.M.I.E.E., No. 2 sub-area mains engineer, North Western Electricity Board, was presented with a console television receiver at a gathering of his present and past colleagues a few days ago. A dinner in his honour was subsequently held at Bolton when he was the recipient of further presentations. Mr Larcombe, who is a native of Hastings, commenced in the supply industry in that town and later joined the staff of the North Metropolitan Electric Supply Co. He followed this with a period of service with the Yorkshire Electric Power Co. and finally joined the Mains Department staff of the Lancashire Electric Power Co. in 1912. In the early part of 1920 he was appointed deputy mains superintendent, which position he held until the end of 1945, when, on the reorganisation of the staff of the company, he was appointed mains superintendent. At Vesting Date he was appointed to the position from which he has now retired. Our accompanying photograph, taken at the earlier presentation shows, left to right: Mr W. Phoenix, M.I.E.E. (sub-area secretary, N.W.E.B.); Mr O. Howarth, M.I.E.E., M.AMER.I.E.E. (late chief engineer of the Board); Mr W. D. Sutcliffe, M.I.E.E., A.M.C.T. (sub-area engineer); Mr R. C. Leslie (late manager, No. 2 Sub-Area); Mr S. D. Larcombe, Miss E. R. Hammond (sub-area accountant's staff); Mr S. M. Rix, F.C.I.S., F.S.A.A. (deputy chairman, Southern Electricity Board); Mr H. G. Bell, M.SC.(TECH.), M.I.E.E. (chief engineer, N.W.E.B.); Mr E. G. Wardle, A.M.I.E.E. (manager, No. 2 Sub-Area); Mr L. Loukes (sub-area consumers' engineer, No. 2 Sub-Area); Mr R. O. Ogg (domestic and commercial sales and development engineer, No. 2 Sub-Area), and Mr J. W. Jones (sub-area planning and construction engineer, No. 2 Sub-Area).

Mr Larcombe receives the presentation from Mr Wardle

The Secretary of State for Scotland has conveyed his thanks to **Mr W. S. Sawtell,** M.I.E.E., who is due to retire from his office as full-time member of the South of Scotland Electricity Board at the end of this year. We hope to give more details next week.

Tribute was paid on Monday last on the retirement of one who has made a major contribution to the British plastics industry—**Mr H. V. Potter,** B.SC., F.R.I.C., M.I.CHEM.E., who relinquishes the managing directorship of Bakelite Ltd., but continues as chairman of the company. Mr Potter became managing director of the Damard Lacquer Co.—the forerunners of Bakelite Ltd.—nearly thirty years ago, and when the concern was converted into a public company in 1948 he was appointed chairman and managing director. He was chairman of the British Plastics Federation in 1937-38 and is a past-president of the Plastics Institute. At last Monday's ceremony Mr Potter was presented with a silver salver, paid for by contributions from the company's 3,000 employees. The presentation was made by **Mr C. C. Last,** a director, who said that a biography of Mr Potter was a story of Bakelite Ltd. **Mr G. W. Dodds,** who is succeeding as managing director, also paid tribute to the work of Mr Potter. The latter was also presented with an illuminated album. A few days earlier, Mr Potter had been the guest of his fellow directors at a private luncheon at which **Mr P. Huffman,** vice-chairman, presented him with a television set on behalf of the board.

Mr Potter, right, receives the gift from Mr C. C. Last

Sir Bernard Keen, D.SC., F.INST.P., F.R.S., has been appointed scientific advisers to Baird and Tatlock (London) Ltd. Until recently he was director of the East African Agriculture and Forestry Research Organisation. Previously Sir Bernard Keen has been assistant director and head of the Soil Physics Department, Rothamstead Experimental Station, director of the Central Agricultural Research Institute, India, and during the war he was scientific adviser to the joint Anglo-American Middle East Supply Centre.

Lord Kershaw has been appointed an additional director of the Railway and General Engineering Co., Ltd.—a subsidiary of H. J. Baldwin and Co., Ltd.

Sir John Dalton, chairman of W. T. Henley's Telegraph Works Co., Ltd., recently presented long service awards to two lady employees who have been with the company for over 40 years—**Miss K. E. Gilbert,** who has served as private secretary to three of the company's chairmen, and **Miss E. M. Bright,** who is now in charge of the Mailing Department at Milton Court.

Prof. H. R. Robinson, F.R.S., has tendered his resignation on medical grounds as Vice-Chancellor of London University, a position he has held since June, 1954. He is Professor Emeritus of Physics in London University.

After more than forty-four years' service with the British Thomson-Houston Co., **Mr N. E. W. Sloan** of the Motor Engineering Staff, has retired. Mr Sloan joined B.T.H. at Rugby in 1911 direct from the Royal College of Science, Dublin. He worked first in the Electrical Laboratory and in the Testing Department before entering what was then known as the D.C. Engineering Department. In recent years Mr Sloan has specialised in the design of d.c. motors and generators for electric navvies, excavators, and ore bridges.

OBITUARY

Mr Edward Hirst, J.P., who was vice-chairman and joint managing director of the British General Electric Co. of Australia from 1940 to 1951, died on 24 Oct., in New South Wales, aged 72. He joined the head office of the G.E.C., then situated in Queen Victoria St, London, in 1904. After holding various appointments in the company's home organisation, including the post of manager of the Newcastle branch, he was appointed managing director of the General Electric de España, S.A. Later he became managing director of the General Electric Co. of Belgium. In 1912 he went on a mission to Australia for organisation purposes and succeeded so well in this task that in the following year he was offered, and accepted, the post of chairman and managing director of the Australian company. On the appointment of Sir Harry Brown as full-time chairman in 1940 Mr Hirst became vice-chairman and joint managing director. He resigned in 1951 but remained a member of the board until his death.

Mr G. P. Joseph, formerly chairman of Murex Ltd., died on 28 Oct., aged 85.

Mr W. A. Scott, M.B.E., A.M.I.E.E., who died on 25 Oct., was works manager to Lancashire Dynamo and Crypto Ltd, between 1930 and 1940, and earlier served in a similar capacity with Crompton Parkinson Ltd. for three years, and at the Phoenix works of the English Electric Co.

Equipment for Industry

Versatile Electric Hoists

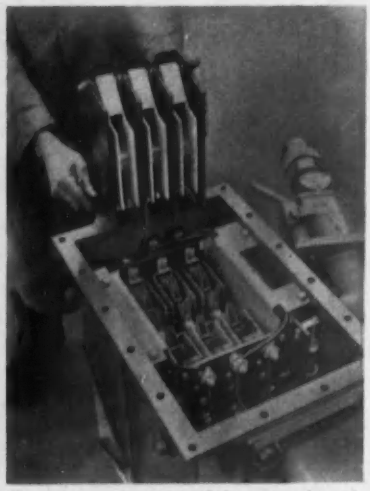
HAVING a variety of lift heights and speeds to cater for the needs from a small workshop to a warehouse, the new range of Munck electric hoists recently introduced by TAYLOR STOKER CO., LTD., 181-191 Drummond St, N.W.1, contains models capable of lifting from 2½ cwt to 10 tons. Hoists can be supplied either for fixed mounting, or with a trolley carriage to suit standard beams. Dependent upon requirements, the trolley may be arranged either for push, hand chain or power travel.

The hoists have one basic design, all-steel construction and the motor completely enclosed within the drum. The motor automatically releases or engages the brake coupled directly to one end of the motor shaft. Gearbox, brake and electrical contacts are all contained within the steel housing. To ensure correct winding of the rope on the drum, a guide operates in conjunction with a limit switch to prevent overwinding and overlowering. When handling loads which require special care, a micro-speed motor may be provided in addition to the normal drive.

The standard Munck hoist No. 221

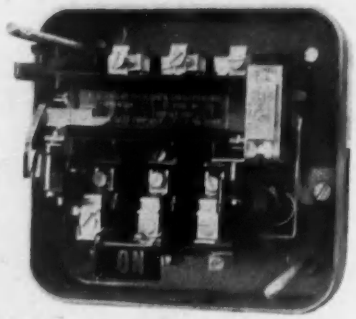
New Flameproof Gate-end Panel

A NEW automatic, flameproof gate-end panel has been installed in a number of British coal mines. Constructed to withstand severe operating conditions, this panel-type F.M.U. 3 has been designed by the GENERAL ELECTRIC CO., LTD., Kingsway, W.C.2, primarily for controlling squirrel cage motors at voltages from 400 to 650 V with full-load currents up to 80 amps. The unit's skid-mounted welded sheet steel case is divided horizontally into two compartments. The top portion houses the 300 amp busbars and a triple-pole reversing isolator, a flange at each end carries three main and two auxiliary bushed terminals for connections to the incoming cable or to adjacent panels. Fitted with series blow-outs and arc chutes, the contactor-type isolator has been designed to break 650 amps at 650 V, 0·2 to 0·3 power factor. The lower compartment contains a withdrawable chassis, on which are mounted the triple-pole main contactor and ancillary equipment. The main contactor has a rating the same as that of the isolator and is able to operate satisfactorily at a maximum inclination of 15° from vertical.



The upper compartment of the gate-end panel, showing the reversing isolator with arc chutes withdrawn

On the top of the chassis are mounted main and auxiliary isolating contacts which, when the chassis is pushed into the case, engage with spring-loaded contacts on the underside of the horizontal partition. These contacts complete the connections from chassis to isolator and thence to the incoming supply, and also those to the outgoing cable through an externally-mounted plug and socket. Thus, a chassis requiring maintenance can be removed and a spare substituted without disconnecting leads.



An interior view of the Autette direct-on starter

Small Motor Starter

A DIRECT-ON starter, the Autette, specially designed for controlling single, two and three-phase fractional h.p. motors up to and including ½ h.p. 200-450 V in situations not requiring a no-volt release, has been recently added to the existing wide range of control equipment offered by the ELECTRICAL APPARATUS CO., LTD., St. Albans. Built to B.S.587/40, this starter contains several standard components including E.A.C.'s latest overload and single phasing prevention unit employing bi-metal elements, which are indirectly heated by replaceable heaters. Basically, the Autette comprises a triple-pole switch closed and opened mechanically by means of self-contained on, off push buttons. In the event of overload or single phasing, the switch automatically trips, thus disconnecting the motor. Although not suitable for remote operation, the starter provides small motors with a control unit giving triple-pole overload protection and safeguarding against single phasing at relatively low cost.

Controlling Soft Rot

WOODEN louvres in power station cooling towers and poles carrying overhead lines in the tropics occasionally suffer a condition known as soft rot. It has been proved that a microscopic fungi, previously believed completely harmless, insidiously attacks timber used in warm and humid situations. Unaffected by normal wood preservatives, this fungi necessitated a lengthy series of investigations before a suitable treatment was found.

Among the organisations seeking a counter to this wood destroyer was HICKSON'S TIMBER IMPREGNATION CO., LTD., Castleford, Yorkshire. This company has developed a copper, chrome, arsenic formulation which claims to immunise timber not only against soft rot, but also other wood destroying fungi and insects. Odourless, non-oily and containing no volatile constituents, the compound, Tanalith C, is said to remain 97% fixed in the treated timber. A high degree of fixation obviously prolongs the life of treated timber and the manufacturers state that timber treated with Tanalith C suffers negligible loss of its preservative even after continuous washing in hot running water or standing for long periods in wet soil or salt water.

The Ann Graham "Vibrette"

MARKETED by ANN GRAHAM SALES, an associated organisation of the British Butanic Lighter Co., Ltd., 39 Great Marlborough St, W.1, the "Vibrette" is the latest beauty aid on the market. Weighing only 6¼ oz and for use on a.c. 100/250 V supplies, it has

This attractive showcard is used to display the "Vibrette"

three separate heads, a sponge head for facial vibration massage, a red rubber-toothed head for the scalp and a cup head for feet and legs. The "Vibrette" is encased in ivory plastic with red relief, and has a convenient thumb-press switch. It is supplied complete with flexible cable and b.c. adaptor plug in a sturdy but neat grained presentation box, and the price 63s. inc. tax.

New Oprim Dryer

NEW cabinet-style rotary drying machine introduced by OPRIM SALES DIVISION of Aircraft and General Engineering Co., Ltd., Albion Works, Park Way, Edgware, embodies several important sales features, viz.: the latest infra-red heating system, the new compact size for modern requirements, no fluff or nap is worn from the clothes which gently rotate in a fully circulating stream of warm air whilst clothes, if necessary, may be aired after ironing and folding. Finish is an elegant all stove-enamelled cream and black. Dimensions are size 23 in. x 23 in. x 36 in. high. Loading 2 kW for 200/220, 230/250 a.c. supplies and the price £52. 12s. 8d. inclusive of tax.

This new restyled rotary dryer is from Oprim

Wayne "Baby" Self-winding Cable Reel

SPECIALLY suitable for incorporating in or adapting lighting fittings to suit the architectural properties of rooms is the Wayne Baby reel which is being marketed by POWER HOUSE COMPONENTS, LTD., Wayne Hse, Regent St, Nottingham, England.

It is constructed mainly of Bakelite mouldings, whilst the spring mechanism and axle are of high grade steel and contacts of brass and copper. The unit is available in dark brown walnut or black. It costs £2, 19s. 11d. net, complete with 10 ft of twin-twisted p.v.c. flex; if supplied with push-bar type lampholder in walnut, the extra cost is 8s. 6d. net each.

The Wayne Baby Reel is available in walnut, dark brown and black

Revised Prices

ALL deliveries as from 27 Oct, of Dimplex oil-filled electric radiators, castor-wheels, chromium plated towel rails, are being charged according to a new price list drawn up by DIMPLEX LTD., Queen's Hse, Kingsway, W.C.2, for account of the changes in purchase tax just announced by the Chancellor.

WILKINS AND MITCHELL LTD., Darlaston, Staffs, have sent a complete list of revised prices for "Servis" appliances as a result of the Chancellor's pronouncement as have the ENGLISH ELECTRIC CO., LTD., Queen's Hse, Kingsway, W.C.2, for their refrigerators, washing machines, rotary ironers and tumbler dryers, and their food mixer with mincer and juice attachments.

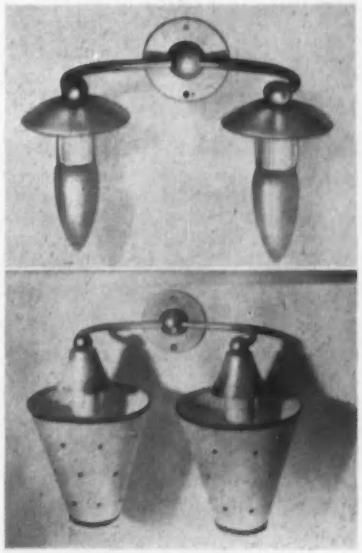
Rowlands not to alter prices of Plinth lights

THE established retail price of the List No. 5000 R.E.A.L. Plinth light of 36s. 9d. inc. tax, and the 5002 Junior plinth of 28s. inc. tax will be maintained, say ROWLANDS ELECTRICAL ACCESSORIES LTD., Real Works, Birmingham 18. The purchase tax increase of one-fifth causes an alteration in the price split-up so the company has decided to bear practically the entire burden and will maintain their present selling price during 1955.

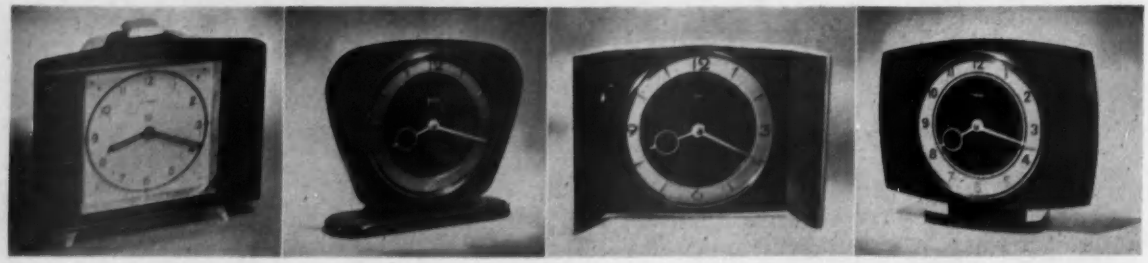
For the Electrical Trade

Candle Lamp Fittings from Linolite

INITIAL supplies will be available this month of two new candle lamp fittings from LINOLITE LTD., 118 Baker St, W.1. The C.2 is a model which will be welcomed by the trader for it is designed for use with candle or standard c.c. lamps and is equally effective with modern or traditional style shades, making it suitable for all types of decoration schemes. Finish is ivory and gilt stoved enamel. The C.2a is an attractive alternative for use with l.c. capped candle lamps. It can be used with or without shades. Finish is again ivory and gilt stoved enamel, and the price of both models, C.2 or C.2a, is 70s. plus 14s. p. tax. It should be noted that the company does not manufacture the fabric shades which are illustrated for effect only.



These two new Linolite fittings are due on the market this month. Top is C2 and below C2a



These new models include from L to R Model 551, 555, 556 and 554

New Ferranti Clock Range Extended

SEVERAL new models now appear in the range of electric clocks available from FERRANTI LTD., Hollinwood, Lancs.

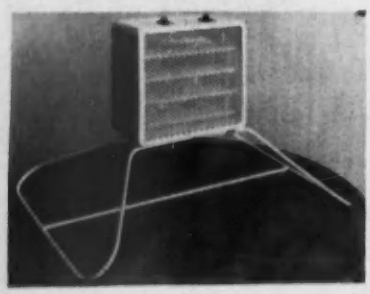
Model 551 is an alarm clock with moulded polystyrene case in maroon, green or cream with either a cream or beige case back. It has a 4 in. square dial with embossed gilt numerals on a cream dial with gilt inner bevel. Luminous spots at the hours are supplemented by larger luminous markings at 12, 3, 6 and 9 for easy identification in the dark. The hands are also luminous. This new clock retains the usual Ferranti feature of 24 hour setting. The buzzer alarm in the new model once having been set functions once every 24 hours yet when quietened does not require to be re-set for the following day. The alarm control knob can be depressed and locked down if the alarm is not required to operate. Three new wood mantel clocks are model 554, a walnut or oak veneer clock with black edging embossed gilt numerals on a cream zone and cream hands. Model 555 in walnut veneer with black edging and green zone or oak veneer with black edging and rich cream zone embossed gilt numerals and rich cream hands. Model 556 is in walnut veneer with cream edging and green zone embossed gilt numerals and rich cream hands.

Two new decorative mantel clocks include model No. 552. Grained brass with black base 5¼ in. dial machine engraved markings on grained silver background. Polished brass hands. Model 553. Grained brass with clear Perspex panel 4¼ in. dial with spun gilt centre and gilt numerals on black background. Black hands.

New K-L Heater Arrives

THE next few days will see the marketing of a new K-L fan heater which, say the KEY-LEATHER CO., LTD., 5 Urswick Rd, London, E.16, replaces all previous models.

The new K-L heater is supported on a tubular stand ensuring utmost stability



This K-L model is a compact steel casing, finished in hard wearing cream stove enamel, containing a multi-bladed fan and motor which force a stream of air over the black-heat element and circulates warm air throughout the room. Switches are mounted on top of the casing to provide either ¾ kW or 1½ kW loading or to operate the fan without the heater. The K-L heater is safe with children because all parts are shrouded behind a grille (in a choice of colours) and the case never becomes too hot because the element too is heat insulated from the casing. The wide-based steel rod stand eliminates any possibility of the heater being upset.

Dimensions of the fan heater unit are 12 in. high x 16 in. wide x 12½ in. deep. Weight is 8 lb and retail price £10. 3s. including £3. 3s. purchase tax.

All Weather Decoration Lamps

ANOTHER new Osram "Coloured Lamp Set," this one specially designed for outdoor use in all weathers, has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet Hse, Kingsway, W.C.2.

Designed for 230/250 V supplies, these new sets either singly or in small groups are ideally suited for domestic use or for shops, restaurants, and, especially, inn gardens. Each set comprises eight 15 W mains voltage lamps two of each, red, blue, yellow and green, and weatherproof s.e.s. lamp holders wired complete with 18 ft of flexible cable. This is fitted with a 5 amp 2-pin plug and a fully protected matching socket at the other. All lamps are coloured internally and are connected "in parallel." Price of these sets is 44s. including p.t., whilst replacement lamps cost 4s. including tax.

Hoover Mark II Heater Version

BRIEF note from HOOVER LTD., Perivale, Greenford, Middlesex, states that their Mk. II washing machine with heater which was first introduced in Scotland and then progressively throughout other parts of the United Kingdom, is now on sale throughout the country.

TRADE PUBLICATIONS

TELECOMMUNICATIONS.—In the form of a magazine issued each season *Modern Telephone Outlook* has been published by Modern Telephones Ltd., 101 Tottenham Court Rd, London, W.1, with the object of issuing write ups on non-standard telephone systems and telling both their own sales staff and potential customers what the firm can do.

LIGHTING.—Rowlands Electrical Accessories Ltd., R.E.A.L. Works, Hockley Hill, Birmingham, have now issued their latest abridged price list, P.5501. Prices in this have been consolidated to take care of latest advances and are now current.

ENGINEERING.—The "Present and the Future" is a brochure issued by the General Electric Co., Ltd., which illustrates this theme by a series of short surveys of topics of urgent importance in which the company has a specialist interest.

PLASTICS. — Advanced information sheets from Bakelite Ltd., 12 Grosvenor Gdns, S.W.1, give details of the new liquid epoxy resin R18774 and Bakelite hardener Q.18884.

AIR CLEANSING.—The problems of air pollution and their solution by the use of the Holmes-Schneible Multi-Wash System in industry are outlined in a new booklet received from W. G. Holmes and Co., Ltd., Twinbridge, Huddersfield.

INSTRUMENTS.—Section A of the miniature range of Pullin Measuring instruments is declared in a new booklet issued by Measuring Instruments (Pullin) Ltd., Electrin Works, Winchester St, Acton, W.3.

SOUND.—The Elagraph, Review of the Philips Industries Electro-Acoustics division has an article on the sound installation at Blackburn Cathedral in the September issue.

COOKING AND WATER HEATING.—The B.N.E. Bulletin No. 30 just issued by British National Electrics Ltd., Newarthill, Motherwell, describes the use of the B.N.E. W/3 cooker by a family of 19 in East Kilbride, Scotland.

RADIO COMMUNICATION.—The Redifon newsletter issued by Redifon Ltd., Broomhill Rd, S.W.18, describes their process of testing radio equipment to its limits.

DOMESTIC APPLIANCES.—Hotpoint Electric Appliance Co., Ltd., Peterborough, have issued a new descriptive list on the Hotpoint Rotary ironer.

CABLES.—Leaflet P.2579 published by Falk Stadelmann and Co., Ltd., 91 Farringdon Rd, E.C.1, gives details of "Hitest" Corrusteel Armoured Cables.

PROBLEMS AND PRACTICE

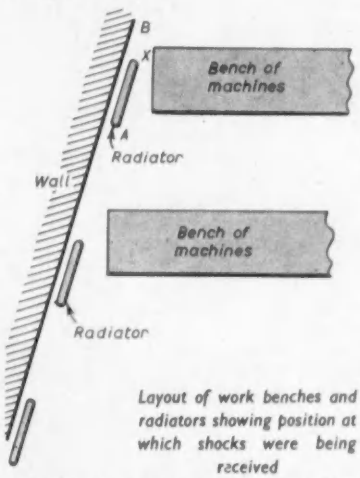
In Engineering

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

Water Radiator Shock

ONE afternoon recently I received a telephone message from a customer informing me that employees were getting electric shocks from a hot water radiator and would I attend to the matter. On arrival, I was taken up to the first floor workroom in which the offending radiator was installed, but on investigation no shock then could be felt and getting confirmation from the supervisor that she could not feel anything, I had to leave with the matter still unexplained after making a definite request that, should another shock be felt at any time, a telephone message should be sent to me at once and not a day or two after the occurrence.

Several days later the same complaint was made, and in about half an hour I was there and began my search. Initially, standing at position A (see sketch) no shock could be obtained on touching the radiator. I then asked the supervisor to show me what she was usually doing when she received a shock. She went around the tables to position B and squeezed through the small space between the radiator and the machine bench, but taking particular care not to touch the radiator this time. Only when doing this, apparently, had it been possible to feel a shock, and, in confirmation, I found quite an uncomfortable shock was experienced on touching the radiator when standing at B.



Layout of work benches and radiators showing position at which shocks were being received

Further investigations then showed that the floor was quite damp at X, whilst there existed a narrow space between the floor boards where the tongue and groove had been damaged. Further enquiries brought me the information that the floor had been washed that morning and it was still quite wet round the point X. With a portable voltmeter connected from the wettest part of the floor to the radiator I got the rather startling reading of 60 V.

A trip to the floor below (then unoccupied) was indicated and on the ceiling below the point X I located a 2 in. wood casing on the side of a joist, terminating there. Removing a length of capping, I found a pair of 7/·044 cables therein, the cables having been sawn in two at the casing's end. A test now showed these to be alive at 230 V. Tracing this cable run back I eventually found a double-pole porcelain fuseholder mounted on the casing, and complete with fuses which I promptly drew. Subsequent testing at the cable ends and also between floor and radiator showed the potential to have disappeared.

It was clear that every time the floor was washed a certain amount of water ran through the niche in the damaged floorboards on to the end of the live cable at the casing end with the result that so long as the floor was wet it was "alive" and a shock could be felt by anyone standing on the spot X and touching the radiator at the same time, especially when the weather was wet and the operatives' shoes were wet on arrival at work. Moreover, squeezing through the restricted space between the radiator and bench was preferred to going the other way round the long bench of machines. The erring cables, apparently, originally supplied a motor which had since been taken out, but it was hardly good practice by the electrician concerned to have left the cables energised in the wood casing in that manner.—"*Harmo.*"

Fire Risk

IN his note in the 20 Oct. issue, "M.N." mentions possible dangers from current flowing in the earth circuit should the neutral fuse blow when an appliance has an earth fault at the neutral terminal. Two cases in my experience may help to underline the danger and in neither instance did the neutral fuse have to blow before the appliance became dangerous.

In the first instance there was a double complaint. An electric iron which appeared to work satisfactorily from one socket-outlet would not work from another although other equipment would. This was the main complaint but just by the way it was mentioned that the wall sometimes got very hot under the main switch.

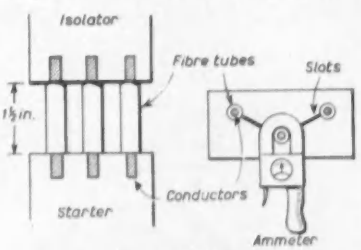
A trial confirmed that the complaint was justified and an examination of connections showed that the earth continuity conductor of the flexible cord had been connected to the neutral terminal of the 3-pin plug and the neutral lead to the earth pin. The heating of the wall was caused by a slack male bush which offered a high resistance to the comparatively heavy current which flowed in the earth circuit while the iron was in use.

Needless to say, at the socket from which the iron would not work it was found that the earth tube lead had not been bonded to the terminal provided. This, incidentally shows the value of the modern practice of having the plate fixing screws complete the earth circuit to the conduit box irrespective of any v.r.i. jumper. Had the fault been on apparatus in more or less continual use the fire danger would have been very grave.

In the second case which I encountered the fault was identical in nature but made so much the worse by the fact that the appliance was an electric kettle and the unearthed socket formed part of a cooker control unit.—*J. G. Potter.*

Measuring Motor Current

THE following is a suggestion for the rapid current measurement of motor current without the irksome and sometimes dangerous task of removing terminal covers of the motor. Instead of enclosing the leads to the switch from the starter in metallic conduit, three fibre tubes are used, and through each is run one of the line conductors. Thus the line current can be checked at any time, for balancing or general overloading, with the aid of the usual clip-on type induction ammeters. Where the live current to the motor is in excess of 250 A the three holes in both isolator and starter, must be joined by means of a slot cut with a hacksaw with two blades in the frame to prevent magnetic induction. The idea has proved particularly useful where motors drive plant in sequence and the breakdown stops a whole section of the plant.—*R. T.C.*



Arrangement of conductors in fibre tubing to facilitate current measurement

NEWS OF THE WEEK

Purchase Tax Rates up by a Fifth

Kettles and Cooking Utensils no longer Exempt

THE electrical industry has had to carry its share of restrictions in the Chancellor of the Exchequer's latest Budget, designed to put Britain's economy back on an even keel. Prominent among Mr Butler's methods was the increase of purchase tax rates by a fifth. Previously purchase tax had been chargeable at 25%, 50% and 75% of the wholesale price of consumer goods, but the Autumn Budget raised the 25% rate to 30%, the 50% rate became 60% and goods at 75% are now chargeable at 90%. Alterations apply as from last Thursday, 27 Oct. In addition to these broad increases, electric kettles and other cooking utensils with a heating element, as well as smoothing and pressing irons, now become chargeable at 30%, whereas previously they were exempt. A change has also been made concerning space and water heaters to make those operated by "bottled" gas or non-mains electricity chargeable at 60% as are those operated from the mains. Purchase tax on electrical appliances is now chargeable as follows:

Exempt	Taxable at 60%		At 30%
Cookers	Refrigerators under 12 cu ft	Vibrators	Kettles
Thermostats	Fires, Radiators and Convectors	Radio and TV Sets	Cooking utensils with elements
Washboilers	Washing Machines	Towel Rails	Bed warmers
Heating elements	Water Heaters (immersion, thermal storage and instantaneous)	Tubular Heaters	Blankets
Hair Clippers	Vacuum Cleaners	Fans	Irons
Sterilisers	Floor Polishers	Clothes Airers	Shavers
Thermal insulation material	Fire Lighters	Drying Cabinets	Filament lamps up to 250 W
Electric vehicles		Dish Washers	Fluorescent ditto 80 W
		Food Mixers	Lighting fittings
		Door Chimes	Hairdryers
		Ironing Machines	Clocks
		Radiograms	Sewing machines
		Electro-medical apparatus	

International Agency for Nuclear Energy

AFTER three weeks of debate, the political committee of the United Nations last week reached agreement on the setting up of an international agency to deal with the peaceful uses of nuclear energy. A world conference will be held to discuss the exact form of the agency and its functions. It will be recalled that both the U.S.A. and Great Britain have promised to make limited supplies of uranium available to such an agency when it is set up. Recommendations for the formation of the agency now go to the U.N. General Assembly.

Another recommendation to come from the committee is that a second international conference on the peaceful uses of nuclear energy should be held in two or three years' time.

ETCA DINNER

ANNUAL dinner and meeting of the Electrical Trades Commercial Travellers' Assoc. will take place on 18 Nov. at the Feathers Hotel, Broadway, Westminster. Dinner tickets (5s. 6d each) may be had from Mr A. J. Murray, "Merry and Wise," 46 Winstanley Rd, S.W.11.

British Nuclear Plans Described in America

LORD CITRINE and Sir John Cockroft were among speakers at a conference held in New York last week. Both spoke about Britain's nuclear energy plans. Lord Citrine, whose remarks were noted briefly in last week's ELECTRICAL TIMES, disclosed that suitable sites had now been found for six nuclear power stations. This was the result of an examination of 26 sites in connection with the building of the C.E.A.'s first two nuclear stations. In another part of his paper, Lord Citrine stated that the Calder Hall power station is expected to cost about £16·5 millions for an output of the order of 65 MW. There has been considerable reticence about the actual rating of Calder Hall, which is not primarily an electricity producing station. The figure assumed by Lord Citrine puts the output of the first two C.E.A. stations at between 130 and 200 MW each.

Sir John Cockroft in his paper reverted to the subject that caused so much discussion at the Geneva conference, whether fusion energy (the H-bomb reaction) can be harnessed for power production purposes. He again stated that Great Britain is seriously working on this problem, but would not suggest a timetable. He noted that the United States has recently stepped up its research effort in this field by a factor of 10.

Western European countries with large hydro sources still undeveloped would have used them up by 1975, Sir John said. Nuclear energy would then be needed.

Dealing with the price of nuclear fuels, Sir John suggested that uranium should become cheaper. Thorium, and the Uranium 233 produced from it in a nuclear reactor, are likely to prove more economical fuels in the long run, however.

C.E.A.'s Capital Programme to be cut by 10%

ALTHOUGH the increases in purchase tax stood out in the Budget statement, the Chancellor also called for economy measures and reduced expenditure from the nationalised industries. In July he mentioned certain measures which those industries were prepared to take, and last week he gave the results of his preliminary surveys. Mr Butler said the C.E.A. had asked the Area Boards for an all-round percentage cut in expenditure during the current year. The actual cut is to be by 10%, as stated by Lord Citrine at the time the Authority's annual report for 1954-55 was published, and subsequently by some Board chairmen. The Chancellor went on to say that even in the priority field of generation the supply industry had been able to postpone some less vital projects while going ahead urgently with the nuclear power programme. He added that the two Scottish Boards had also been tackled on the same matters by the Secretary of State for Scotland.

The Chancellor said that "promotional expenditure" was being cut, and working capital employed in hire purchase activities; and stocks held for those activities have been curtailed.

A more detailed survey of capital projects as well as of internal resources, has been carried out, Mr Butler went on, and the results would be incorporated in the investment programmes the industries were about to submit to the Government. These programmes are submitted annually, and he warned that this year they would be subjected to more critical examination than had been the practice on previous occasions.

1956 RADIO SHOWS

IT has been announced by the Radio Industry Council that the 23rd National Radio and Television Exhibition—the Radio Show—will take place at Earl's Court, London, between 22 Aug. and 1 Sept. next year. At the same time, the Radio and Electronic Component Manufacturers' Federation state that their annual private exhibition will be at Grosvenor Hse, London, from 10 to 12 Apr. There will be a preview for overseas and other guests on 9 Apr.

Film Made of 1955 Electrical Exhibition

Over 300 Exhibitors will cause Full House Next Year

UNPERTURBED by the inauguration of the electrical section in the London B.I.F., the organisers of the Electrical Engineers Exhibition are going from strength to strength in preparations for their fifth show next year and for succeeding displays. It was announced from the Exhibition's headquarters last week that the total number of 1956 exhibitors was within one of 300, and there was room for six more. As a result of these bookings, the 250,000 sq ft of Earls Court's ground floor will be full next March, and there is talk now of taking over the galleries for the sixth exhibition which will take place in 1957.

Last week we had the opportunity of recapturing some of the highlights of this year's exhibition, when a film of the event had its first showing. Produced for the A.S.E.E., the film is a 16 mm documentary in black-and-white with a running time of 30 mins. It is a noble effort, featuring many of the novel exhibits; and with appropriate commentary, should do much to commend this exhibition to all in the electrical industry, and not a few outside. It is a notable fact that the A.S.E.E. are one of the first to sponsor a film of an exhibition. A significant feature of the premiere was the presence of about 20 representatives of trade and commercial departments of Commonwealth offices and foreign embassies. Information passed on by these guests from overseas will undoubtedly help a great deal in boosting the already formidable advertising undertaken abroad. The export market is now vitally important.

Mention must also be made of the most attractive album of photographs taken of the Exhibition last March. This is to be forwarded shortly to H.R.H. the Duke of Edinburgh, who, we understand, has expressed a keen desire to see it.

Next year's Exhibition is to be held at Earls Court from 20 to 24 Mar.

Innovations at S.I.M.A.'s Fourth Convention

OPENING at the Grand Hotel, Eastbourne, next Thursday (10 Nov.) is the fourth annual convention of the Scientific Instrument Manufacturers' Association. This year representatives of the British Industrial Measuring and Control Apparatus Manufacturers' Assoc. have been invited to attend, and take part in the discussions, for the first time. This year also, numbers should be swelled still further by the attendance of S.I.M.A.'s new group of associate members. The convention closes on 13 Nov.

Research Centre

A NEW research and development establishment of their Aircraft Equipment Dept., has been opened by Ferranti Ltd. at Westwick, Bagshot Rd, Bracknell, in Berkshire. It will be concerned primarily with the development of new systems and components for aircraft electrical equipment and instrumentation, especially for gyroscopic and associated navigation systems.

Special attention was paid recently to the Carron Co's "L" series of electric cookers at the N. of Scotland Hydro-Electric Board's showrooms in Union St. Aberdeen. Demonstrations were held daily for a week in the demonstration hall of the showroom, and, as our illustration shows, a display was arranged in the main hall and window. Miss Heron, head of Carron's domestic science department, is seen using one of the appliances

TRAFALGAR DAY

As part of the 150th anniversary celebrations of Trafalgar Day the Admiralty arranged for the floodlighting of the "President" and "Discovery" on the Thames Embankment in London. Illuminations were devised by Siemens Electric Lamps and Supplies Ltd., and those for the "President" are shown here. Six Royston and Drayton wide angle floodlights lit the hull of each ship from the Embankment wall, supported by two lamps on each pontoon to lighten shadows. A mixture of wide and medium angle floodlights were used to emphasise the radar mast and funnel. In the case of the "Discovery," narrow angle projectors picked out the masts effectively

"Fairs within a Fair" is Future Policy of B.I.F.

LAST week too, British Industries Fair Ltd. gave an outline of their plans for the immediate and more distant future. Mr Kenneth Horne, managing director, said that B.E.A.M.A. and other associations in the industry were giving full support, and the response from leading firms was so great already, that a successful electrical exhibition was assured. It is understood that the total number of firms who are definitely exhibiting is about 60 at the moment, whilst after current negotiations at least another 60 will be taking part.

Besides organising an electrical section in London, B.I.F. Ltd. are now planning an electronics section at the request of some specialist firms. Although this new section is envisaged as an entity in itself, some overlapping is inevitable in the first year at least, they state.

Speaking of the future, Mr Horne said there was no doubt at all that the B.I.F. was going to expand. Part of that expansion, he said, might include providing an "umbrella" under which existing trade shows could join in whilst retaining their own identity. Trade associations were being invited to discuss the possibilities of such an arrangement. A federation of Fairs-within-a-fair might be the pattern for the B.I.F. of the future, he said, with the benefits of the B.I.F's world-wide publicity added.

Handbook of London Div.

THE London Division of the C.E.A. have just produced a most attractive and comprehensive Handbook containing a wealth of information, detail and statistics about themselves. It is published primarily for visitors to the Division from other parts of the U.K. and from abroad. The organisation of the Division is explained in eight chapters covering all phases of operation and including generation, transmission, the technical dept., system operation, accountancy and administration. From then on readers are treated to details of each power station, their operational statistics, transmission systems (including lengths of cable and the number of towers in service) and to explanatory maps and charts. The whole is admirably compiled and amply illustrated. The Handbook comprises a total of 66 pages.

OFFICIAL PUBLICATIONS

B.S.I. ANNUAL REPORT for 1954-55 (see page 672). Available from Instn., 2 Park St, W.1, 5s.

CUSTOMS AND EXCISE. Increase of P.T. Rates and Other Changes. Notice No. 78 K (see page 692).

CENSUS OF PRODUCTION (1956) (Returns and Exempted Persons) ORDER 1955—S.I.1592. (See page 696.) H.M.S.O. 2d.

Course on Electricity in Commercial Catering

COMMERCIAL catering was the subject of a 3-day residential course held under the auspices of E.D.A. at the Imperial Hotel, Blackpool, last week. Representatives of seven Electricity Boards in this country, as well as the Belfast Electricity Department and Electricity Board for N. Ireland, were present, and there was, at the same time, an exhibition of appropriate electrical equipment. A total of nine papers were read during the course. Subjects covered were main cooking equipment; service and snack bar equipment; food preparation and kitchen hygiene; care, use and maintenance; planning and selection of equipment; operational comparisons; selling commercial catering; consumption of electricity and cost; and the running of a large kitchen. The course was opened by Mr G. A. Robertson, manager of the N. Western Board's Preston sub-area, and Mr H. G. Gamble, of the Eastern Board.

C.E.A.'s Reply on Assisted Wiring

HACKNEY Borough Council have just received a letter explaining the C.E.A.'s attitude towards proposals for an assisted wiring scheme. The letter points out that the matter has been discussed and considered on more than one occasion, and concluded that it would be impracticable to return to pre-war practices. It explains that the schemes operated pre-war by some undertakings were to secure a more rapid adoption of electricity supply, and it was no part of the object of those schemes to relieve consumers of their responsibility for maintenance.

Any assisted wiring scheme, the letter went on, would have to be a national one, which would immediately give rise to complaints, because of the wide disparity between the practices of different Boards. The same result would follow if any discrimination was made between classes of consumers. In addition, the operation of such schemes would not only prove costly, but would involve the diversion of the limited capital resources available to uneconomic development. If the Boards cannot take action in the matter, it is only because they are prevented by very real obstacles, the letter concludes.

As reported in our 13 Oct. issue the Metropolitan Boroughs' Standing Joint Committee have made representations to the London Electricity Consultative Council, asking them to urge the Area Board to adopt an assisted wiring scheme on lines of those formerly operated by local authorities owning electricity undertakings.

Illumination Course in Birmingham

DETAILS of Birmingham's Illumination Design Course were received last week. It will consist of five lectures to be delivered on consecutive Thursday evenings at Regent House, St Phillips Place, in Colmore Row, and beginning on 17 Nov. The five talks, in order, will be on Electric Lamps, Showroom and Office Lighting, Lighting Design, Lighting for Decoration and the Home, and finally, Industrial Lighting. Each lecture will be followed by a discussion, and the organisers invite prepared or impromptu questions on the subject of the evening's talk. Applications for reservations should be made to E.L.M.A.'s Birmingham office at 111 New St.

WELDED STRUCTURES

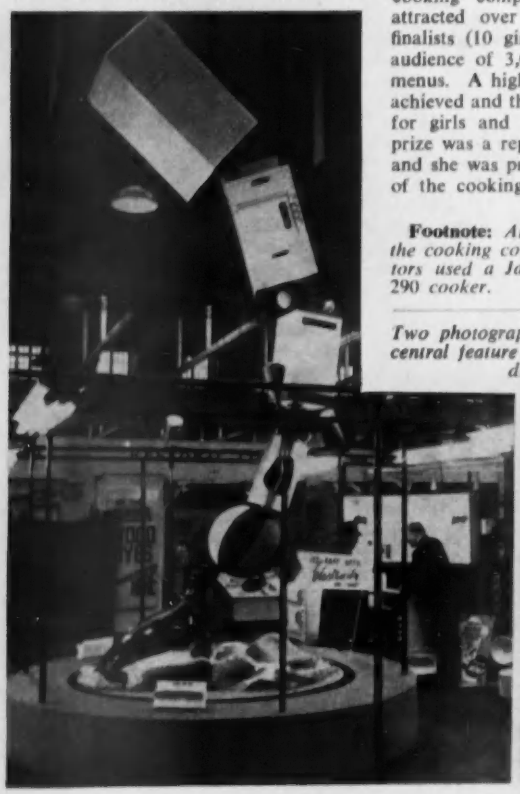
ANOTHER course on the Design of Welded Structures is to be held in Glasgow. It follows the very successful course held last year and will open on 10 Jan. next at the Instn. of Engineers and Shipbuilders, 39 Elmbank Cresc. The course is aimed at helping designers and draughtsmen of welded structures, and talks will be given by the technical staff of Quasi-Arc Ltd., of Bilston, Staffs., from which company full details may be obtained.

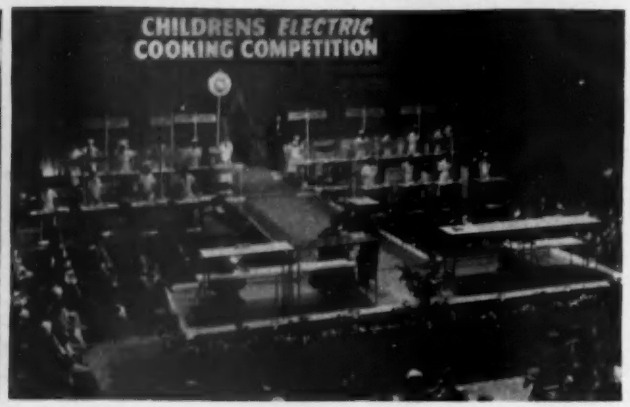
Electrical Competitions at Glasgow Exhibition

THE four foundations of modern living were prominently featured at the Glasgow Modern Homes Exhibition last month. A revolving seal with a water heater, washing machine, cooker and refrigerator, balanced on its nose was the eye-catching focal point of the S. of Scotland Electricity Board's stand. There was also a good assortment of appliances on other parts of a stand which included three demonstration areas devoted to cooking, refrigeration and laundry. A novel competition was also notable. Prospective brides were asked to guess what electrical appliances were hidden in each of three tiers of a 3-tier wedding cake. Only one of hundreds guessed correctly. She was Miss Elizabeth Cartin who will be married on 15 Dec.

An established feature of the exhibition was the finals of the Board's Children's cooking competition, which this year attracted over 5,000 entries. Nineteen finalists (10 girls and 9 boys) faced an audience of 3,000 to prepare their final menus. A high standard of cooking was achieved and there were three prizes each for girls and boys. The lucky bride's prize was a replica of the wedding cake, and she was presented with it at the end of the cooking competition.

Footnote: *At Dumfries area finals of the cooking competition, all 20 competitors used a Jackson Electric Stove Co. 290 cooker.*





Two photographs taken at the Glasgow Modern Homes Exhibition show (left) the central feature on the S. of Scotland Electricity Board's stand, and (below) a scene during the finals of the Children's Cooking Competition

A motorist way down in
Bicester
Was hailed by an expert, Hey
Micester!
If you listen to me
I think you'll agree
That PVC makes an effective,
economical and easy to fit
petrol tubing

Father Christmas was
terribly worried
When to package his
presents he hurried
So he spoke to a pal
Who was at Lorival
And learned that PVC
sheeting would be an
effective, economical,
moisture-and-chemical-
proof answer to his
packaging problems

more

Some limericks — from the lively lads at Lorival...

A keen, conscientious
ragazzo
Was thinking about his
terrazzo
This problem of flooring
Would be very boring
Were it not for the
incontrovertible fact
that PVC makes an
effective, economical,
easy-to-fit and wholly
reliable flooring strip
for use with terrazzo
flooring

Said Dante engulfed in
the fire
Of the Inferno while
plucking his lyre
Six hundred years hence
Any fireman with sense
Will specify PVC
for a remarkably
effective, tough,
durable fire hose
lining

Said the Amp
to the Volt with a titter
No wonder, my dear,
you're so bitter,
This leak they can mend
In a moment, old friend
Because PVC makes
an effective, economical
insulating material for
all sorts of electrical
work

PVC, in the hands of Lorival's lively lads, can do a lot of jobs better and cheaper. Why not drop a line to Lorival? Then you can get together with the lively lads and figure out ways and means of using PVC to your advantage.

LORIVAL PLASTICS

United Ebonite & Lorival Ltd., Little Lever, Nr Bolton, Lancs.

L64

"PROMPT DELIVERIES"
"COMPETITIVE PRICES"

CONTACTORS *by*

RANGE 10-1000 AMPS

HEAVY DUTY CAPACITIES · · · B.S. SPEC. 775

ECC

To customers demands

THE ELECTRIC CONSTRUCTION COMPANY LTD
BUSHBURY ENGINEERING WORKS
WOLVERHAMPTON

BROCHURE S.830
GIVES FULL DETAILS
(available on request)

NO CONNECTION

IN VIEW of some confusion existing in the trade, the Chertsey (Surrey) firm of British Klockner Switchgear Ltd. have asked us to remind the industry that they are not associated in any way with the Klockner-Moeller Co. of Germany. British Klockner say they find that many machine tools are being imported from Germany which have fitted control gear made by Klockner-Moeller, and they are constantly being asked to service and repair the control panels.

In this connection, we would point out that the London representatives of Klockner-Moeller are W. R. Vaughan Ltd., 4 Queen St, Curzon St, W.1.

Perspex Lettering for New Shop Sign

Interest in the sign illustrated above lies mainly in the use of Perspex, a new trend which has been growing in popularity during the past year or so. This particular sign is in King Edward St, Hull, and was the work of Franco Signs Ltd. It is claimed that Perspex possesses good light transmission qualities, and in this case illumination from a double line of white fluorescent tubing is diffused evenly over the entire surface of the letters which are 22 in. high. The only tubing visible is an outline of primrose round each letter, but care has been taken to mount this tubing flush so that the sign is as attractive by day as it is by night

£1¼ m. to Educate Future Scientists

SEVENTEEN industrial organisations have established an industrial trust to help in the teaching of pure and applied science and mathematics in secondary schools. The Trust announced on Tuesday that over £1¼m had already been guaranteed. It will be known as the Industrial Fund for the Advancement of Scientific Education in Schools, and will operate from 20 Savile Row, London. The sponsoring companies include at least five of electrical interest. The full 17 are Associated Electrical Industries, British Insulated Callender's Cables Co., British Petroleum Co., British Portland Cement Manufacturers Group, Courtaulds, Distillers Co., English Electric Co., Esso Petroleum Co., General Electric Co., Arthur Guinness, Son and Co., Imperial Chemical Industries, Imperial Tobacco Co., Rolls-Royce, Shell Petroleum Co., Tube Investments, Vickers and the Wellcome Foundation. The group plan to help independant and direct grant schools where facilities for teaching science subjects are seriously inadequate through lack of capital resources. Assistance will be in the form of capital grants towards building, modernisation, and equipment of science buildings. It will be available to schools throughout the U.K. It is expected that many other companies will add their support in due course.

Radio Premium Awards for Technical Articles

A LEAFLET produced by the Radio Industry Council is being distributed for display in factories of member-firms reminding them of the Council's offer of premiums for technical writing. The award scheme, now in its fourth year, is open to non-professional writers of technical articles on radio and electronics. Up to six premiums of 25 guineas each are offered annually in respect of articles judged likely to enhance the reputation of Great Britain in radio, television and electronics. The 19 awards made to date have been for articles in radio and electronic journals, but, the leaflet points out, many industries are increasingly using electronic methods of control and production, and articles in the journals serving a wide variety of industries are eligible, provided they can be bought by the public. An innovation is that one premium is for articles published in manufacturers' own journals, provided they have an overseas circulation and can be bought by the public.

University Men told What Industry Wants

THE shortage of technically qualified persons to fill executive positions is a problem which has faced management in industry for some time now. Efforts to find a solution are being taken by the N. East Industrial Development Assoc. who are sponsoring a series of visits to large factories by senior industrialists and members of local universities. The object is to illustrate at first hand the problems of modern industry and the type of men that industry is seeking now.

The first of these visits took place last week, when Sir James Duff, warden of Durham University, and senior members of King's College, Newcastle, went to the St. Helen's Auckland factory of Westool Ltd. There was a discussion of What Industry Wants from the Universities, and afterwards the visitors were conducted on a tour of the factory.

The First Half-Century

The Post Office want to lay some of their telegraph wires underground, in order to make room overhead for new trunk telephone wires from Cardiff to Pontypridd, but the Corporation has refused its assent. On Saturday last the case was argued before a magistrate. For the Post Office it was contended that the efficiency of trunk telephone circuits was impaired if lengths here and there were placed underground. To this the Corporation replied that they wanted to meet the Post Office, but they thought the whole of the telegraph wires in the town should be buried, and they asked the magistrate to impose that condition. As to the G.P.O. objection to placing the telephone wires underground, it was, they urged, a curious fact that the N.T.C. was actually pressing the Corporation for leave to bury its wires.—*From our issue of 2 Nov., 1905.*

Industrial Maintenance

THE above special section in last week's issue of the ELECTRICAL TIMES contained on page 637 a table headed "typical starting torque values for motors." The fourth line of this should relate a starting torque of 60 to 100% full load with star-delta starting of a double cage rotor, motor and not as stated.

Special packs for Argenta lamps and a seasonal version of the current Philishave poster have been produced by Philips Electrical Co., Ltd., for the Christmas trade. The packs illustrated form a novel attraction for children, when empty, as the rear panel includes cut-outs of Father Christmas, a robin, a tree, a porch and a cat. These are tabbed for fitting in slots

Great Improvement in Street Lighting Columns

A MARKED improvement in the design of street lighting columns is reported in the tenth annual report of the Council of Industrial Design. This, it is stated, is a result of the formation in 1952 of the Council's Street Furniture Committee, and the subsequent discussions between them and manufacturers. In many cases, consultant architects and designers have been introduced to industry. The first list of approved designs was issued just over a year ago, and those will be the only ones to qualify for the Ministry of Transport's contribution to local authorities eventually, because the earlier designs are to be withdrawn over the next five years. About 3,000 copies were distributed to local authorities, who are now using the designs more. The report goes on to state that New Towns have given a lead by carefully selecting and siting street furniture, and the Royal Fine Art Commissions continue to advise on the selection and siting of equipment.

Seven pages in the report illustrate some of the designs for which the Council recommended designers from its Record, which now contains about 2,500 names. Electrical items included are a B.T.H. concrete street lighting column, and a refrigerator by Pressed Steel. Introductions to designers are arranged free, and during the year reviewed 386 were affected.

Census of Production

AS previously announced, the 1955 Census of Production, to be taken next year, will be a simplified census on a sample basis similar to those for 1952 and 1953. An order prescribing subjects requiring returns has now been made by the Board of Trade. It is the Census of Production (1956) (Returns and Exempted Persons) Order 1955. Undertakings producing coal, gas, electricity, oil-shale, crude or refined petroleum or shale oil products are exempt to the extent that they already provide returns to the Ministry of Fuel and Power. One modification has been made to the sampling scheme. Firms engaged in mining and manufacturing employing ten persons or fewer will not have to make returns.

The Public Prosecutor

SIR Howard Roberts, Clerk of the Council of the London County Council, had some amusing and interesting anecdotes to recall when he spoke at last week's luncheon at the Batti-Wallah's Society. He dealt particularly with the period when he was acting on behalf of the Public Prosecutor, and gave high credit to the police on several occasions for acuteness of observation of data. Mr Mate—Mr T. C. F. Bigland—in his announcements at the end of the luncheon, asked Sir Harold Bishop to take a bow on the occasion of his election as Hon. Member of the Society.

NEWS IN BRIEF

Alfa-Laval Co., Ltd., of Brentford, opened a new modern factory at Cwmbran, Mon., last month.

Midlands Electricity Board have acquired 8 acres of the former Malvern Hotel for new sub-area headquarters, district offices and depot.

Lunch-hour film shows and the opportunity of viewing pairs of protective footwear were features of the National Industrial Safety Week exhibition at Automatic Telephone and Electric's Liverpool works. Over 2,500 saw the exhibition which was divided into six sections covering electrical safeguards, first aid and fire fighting, eye protection, protective clothing, machine guarding, and food protection.

Nineteenth annual dinner of the B.T.H. Overseas Assoc. took place at Rugby on 21 Oct. Guest of honour was the Rt. Hon. Lord Baillieu.

PRACTICAL TRAINING ABROAD

LAST summer, 644 students of technology from Great Britain spent a period abroad under the auspices of the International Association for the Exchange of Students for Technical Experience. 83 of these students were concerned with electrical engineering. 728 students came to this country from abroad, 151 of them electrical engineering students. The scheme now covers 21 countries, and it is anticipated that South Africa will join in January next. The statistics are included in the 8th Annual Report of the Association, which was published on Tuesday. Amongst other points of interest in the Report is the announcement that new arrangements are being made which should considerably increase the exchange of students between the U.S.A. and other member countries. A new feature of the Association's programme is provision for technical college students as well as those at universities.

QUESTIONS IN PARLIAMENT

Gas and Electricity Expenditure

QUESTIONS on the reduction in promotional advertising expenditure of the gas and electricity supply industries were put by Mr G. Nabarro. The Minister of Fuel and Power replied that in the current financial year the two industries would be reducing their advertising expenditure by nearly £500,000, which would be available to finance capital investment. The Minister said he did not intend to regulate their advertising.

Mr Nabarro continued to question the Minister on capital expenditure. Mr Lloyd informed him that the whole matter was under review; but although figures were not available, it was already apparent that capital projects amounting to several million pounds had been slowed down or postponed. In revising their capital investment programmes both industries had full regard to the need to maintain essential production of gas and electricity, he added.

Highlands' Capital Investment

CHANGES in the planned capital investment programmes of the N. of Scotland Hydro-Electric Board were queried by Mr G. Nabarro in view of the current economic policy. Mr J. Stuart explained that he was discussing the programme at present with both the North of Scotland and South of Scotland Boards.

U.S. Electrical Contracts

ONCE again the U.S. Government's imposition of tariffs, and refusal of British tenders for electrical contracts, was raised in the House, and Mr P. Thorneycroft repeated that the U.K. Government had expressed their grave disappointment at decisions on contracts for the Chief Joseph Dam. Mr J. Grimond asked if it was not of vital importance if we were to clear our debts to America, that she should allow us to trade with her. Mr Thorneycroft said what was distressing was that the series of decisions seemed to run contrary to the expressed wish of the U.S. in these trade matters.

Street Lighting Standardisation

A REQUEST for the standardisation of street lighting throughout the urban areas of Great Britain was made by Mr H. Davies, who also asked the Minister of Transport to make a statement. Mr J. Boyd-Carpenter said lighting authorities were advised to adopt the standards recommended by the Departmental Committee on Street Lighting in their reports of 1935 and 1937, where they were providing new equipment. The rate of progress, he added, depended on the financial resources of the responsible authorities.

Hire-Purchase in Advertisements

AN amendment to the Hire Purchase Act, 1954, was proposed by Miss E. Burton, who asked if the amount of deposit, the number of instalments and the amount of each could be stated clearly on all postal and newspaper advertising. Mr D. C. Walker-Smith replied that the Board of Trade were not satisfied that legislation of that kind was necessary, but the matter was being considered and discussed with trade associations.

Overseas Trade Fairs

THE Board of Trade will not assume responsibility for the success of British displays at the most important overseas trade fairs, Mr A. R. W. Low stated in a written answer. He said the main object was to sell goods and that was the function of industry and not the Government. The B.o.T. provided information stands at many fairs, and small exhibits at some. Mr M. Lindsay drew

the Minister's attention to the national efforts made by other countries, especially the U.S. and Russia, and later Sir J. Lucas said that of 14 centres represented officially at Stockholm's St. Eric Fair, the British exhibit was the smallest. Mr Low pointed out that 100 British firms exhibited in the trade sections and the B.o.T. stand was an information centre only. It was not policy to spend public funds on national prestige exhibits at that Fair.

Geneva Atom Conference

REPORTS from all sources confirmed the considerable success of the Conference on the Peaceful Uses of Atomic Energy, held in Geneva in August, the Prime Minister told the House. Much information of importance to the development of peaceful uses of atomic energy were made available and discussed, he said, and all countries should benefit. He added that the U.K. had made notable contributions both to the conference and the exhibitions. Mr B. Janner asked if the full report of proceedings could be made available to Members.

Traffic Indicators

THE Minister of Transport stated last week that he had received a report from the Road Research Laboratory giving the results of their investigations on semaphore arms and flashing lights on private cars. He said he was now considering the report.

B.S.I. Consumer Advice

IN a written reply, Mr D. C. Walker-Smith explained that the purpose of their Advisory Council was to keep the British Standards Instn. informed on matters where consumers had asked for standards, and the Council's interest in consumers' complaints was only to help in judging where standards were required. He did not think it advisable to interfere with that arrangement. Miss E. Burton had asked if the B.S.I.'s Advisory Council could be empowered to deal with consumers' complaints.

Sayings OF THE WEEK

"Atomic energy does not challenge the use of coal; it challenges the use of coal in making electricity. . . ." DR S. BRONOWSKI in his W. M. Thornton lecture.

"Many qualified engineers think that going on to the factory floor to help sort out production problems is beneath their dignity. . . ." MR D. A. NEILL, in discussion on Methods of Co-operation, at Piecebridge.

"It costs as much to strike a match as to keep a 40 W lamp alight for an hour. . . . PROF H. G. SANDERS in the inaugural George Johnstone Lecture.

ELECTRIC SUPPLY NEWS

Aldershot

A new grid supply point at North Camp is expected to be in commission by the Southern Electricity Board by the end of this year. This is one part of a large capital development scheme being undertaken around Aldershot.

Blyth

Northumberland County Council, Northumberland River Board, and the Councils of South Shields, Tynemouth, Sunderland and Seaton Valley, are to continue their opposition in the House of Commons against the Blyth Generating Station (Anciliary Powers) Bill which concerns the erection of a new power station near Blyth. The authorities are not opposing the erection of the power station itself, but the proposed system of ash disposal by means of sluice pipes from the beach at Cambois near Blyth. The opposing authorities contend that this ash may be washed back on to the beaches by the tide.

Cumberland

The British Travel and Holidays Association has paid compliment to the supply authorities responsible for the delicate shade of green of the pylons in Cumberland and Westmorland, which they consider tones in perfectly with the surrounding countryside. The South of Scotland Electricity Board does not intend to change from their grey galvanised pylons, feeling that once they started painting the hundreds of pylons, a full-time job would have been undertaken.

East Anglia

The construction of a new 132 kV grid transmission line from Ipswich, via Stowmarket, to Bury St. Edmunds, awaits permission of the planning authorities. Total distance involved is about 25 miles, as originally planned, but changes in route may yet be necessary.

Eire

The Electricity Supply Board has placed a contract with John Paul and Co. for the construction of the Arigna coal-burning power station on the western shore of Lough Allen, about four miles from Drumshanbo. This station, the first to be erected in Eire to burn native coal, will have one 15,000 kW turbo-alternator and one 165 klb/hr boiler which are to be of German manufacture. It is expected to be in operation in about two years' time.

Houghton-le-Spring

The Urban Council has approved plans by the North-Eastern Electricity Board for the construction of a 20 kV overhead line to reinforce the existing 6 kV system.

Isle of Man

Legislation is to be introduced to make the Isle of Man Electricity Board liable in the event of their apparatus causing interference with radio or TV reception, it was agreed in Tynwald recently. The Douglas Corporation is already liable in such instances, and it was felt that the Isle of Man undertaking should be brought into line. In the discussion in Tynwald, two members of the Electricity Board, Mr J. R. Corrin (chairman) and the Speaker said the Board had no objection to being made liable for nuisance, but suggested that the matter should be held over until the Electricity Commission report was presented. The question of interference with wireless was specifically referred to the Commission and it could be raised on their report. It was also stressed that the Board had spent large sums in looking for defects in overhead lines or making alterations to transformers to remedy faults that may have caused interference.

Settle

Proposals of the North-Western Electricity Board for the erection of overhead lines to supply Malham Tarn and the Ribblehead area, have been approved by Settle Rural Council, subject to the observations of the area planning officer.

Stanley (Co. Durham)

The Urban Council has approved proposals by the North-Eastern Electricity Board for the laying of 22 kV underground cable and auxiliary cables between Maiden Law and Greencroft, and also overhead cables between the two points, in connection with proposed 66 kV supplies in North-West Durham. Plans have also been approved for overhead cables to reinforce the network in the Crookgate area.

Wolverhampton

A site is being sought in the Lower Penn area for a new 275 kV grid substation, it is reported.

LIGHTING SCHEMES

Exmouth. U.D.C. is to modernise lighting along the main A377 road through the town.

Fylde. The R.D.C. has approved a scheme for street lighting throughout the rural district at an estimated cost of £25,000.

Middlesbrough. T.C. has received Ministry sanction to spend £12,200 on 93 street lamps on cross-town routes, and £6,300 for lighting a section of Acklam Rd.

Ongar. Street lighting is to be converted from gas to electricity.

Sherburn-in-Elmet. The Parish Council propose to convert street lighting from gas to electricity at a cost of £2,944.

Urmston. New lighting is to be provided along part of Moorside Rd at a cost of £2,750.

COMPANY ACTIVITIES

A BRIGHT idea to make sure of raising £197,000 from shareholders is announced by A. H. Hunt (Capacitors) Ltd. The idea is to give a 100% share bonus after the shareholders have subscribed 16s. 6d. each for 247,500 Ordinary shares at 4s. each. Both old and new shares will rank for the bonus. Sydney H. Brewell, the chairman, is optimistic about the current year's trading. He mentions a keen demand for the company's products for which new uses are continually to be found as the electronic industry develops. The proceeds of the cash issue are to finance the bulk of the company's programme of expansion and modernisation, of which the principal elements are the erection and equipment of the factory at New Addington, Croydon, and the installation of new machinery to increase mechanisation in the Wandsworth and Wrexham factories.

Following an increased interim dividend of 75%, Gas Purification and Chemical announces a share bonus of 400%. This is a timely move, for the 2s. shares which make up the current £94,000 capital are at the ungainly price of 45s. The Board is also increasing authorised capital from £500,000 to £1 million. This evidently means further expansion and I wonder which direction it will be this time. The company has already branched out into electronics, machine tools, electrical engineering, including TV aerials. What next?

Copper users have probably noted that both Rhokana Corpn. and Rhodesian Anglo-American, its holding company, are again raising their dividends for the year to June 30 last. Rhokana pay a final 42s. 6d. net per £1 Ordinary and "A" stock, making a total of 52s. 6d. net for the year, as compared with 50s. net. Net profit after tax went up nearly £1½ millions, to just over £10 millions despite three months' strike in Jan.-Mar. 1955 when both production and sales were adversely affected.

Impressive results have been announced by Morphy-Richards for the year to June 30 last. Sales increased by nearly 50% and exports by over 30%, while trading profits jumped £165,000 to £487,000. The general inference is that such companies will not do so well in the current year owing to restrictions on h.p. But against that I would put the point that the bulk of Morphy-Richards business is in electric irons, which are usually sold for cash. On prospects I would not say the 4s. shares at 28s. are dear based on the 1954-1955 50% dividend. The yield is over 7% and the earnings well over 130%.—*From our City Correspondent.*

Aerialite Ltd.

After all charges, including taxation, the net profit for the year ended 31 May last is £120,435, compared with £78,886 for the previous year. There is a final dividend of 27½% on the Ordinary capital as increased by a one-for-one scrip issue and a subsequent one-for-three rights issue. The interim was 17½% on £150,000 capital. Last year a total of 88½% was paid on £75,000 capital.

British Electric Transformer Co.

The net profit, after all charges, including taxation, for the year ended 30 June last, is £35,252 (*£82,979*). The dividend is 1s. 3d. per 5s. share (previous year 3s.), plus special dividend of 6d. per share tax free.

Crompton-Parkinson Ltd.

Consolidated group net income for the year ended 30 June last is £2,236,420, compared with £2,047,291 for the previous period. After all charges, including taxation, the figures are £940,735 and £838,175 respectively. The final dividend and special cash bonus are each of 6%.

Dowding and Mills Ltd.

For the year ended 30 June the profit, after tax, is £47,367 (*£33,026*), and the dividend is again 50%, but on capital increased by a 50% capital bonus.

A. H. Hunt (Capacitors) Ltd.

Underwriting was completed last week for the cash issue of 247,500 Ordinary 4s. shares at 16s. 6d. each in the proportion of three-for-ten, to which we referred on 13 Oct. When the issue has been completed, it is proposed to double the then issued Ordinary capital by capitalising £214,500 of reserves in an issue of 1,072,500 new Ordinary 4s. shares on a one-for-one basis. Sales in the current year are up on last year and the directors, following the 7½% interim dividend already paid, expect to maintain the same final dividend as last year on the increased capital. As the scrip issue shares also rank for the final dividend, the proportionate rate would be 10% of the total issued capital of £429,000 as increased by both issues.

Longmore Brothers

This conduit and steel tube concern reports a net profit, after taxation, of £48,055 for the year ended 4 Aug. last, against £14,750 for the previous year. The dividend is 15% plus bonus 5% (7½%).

Morphy-Richards Ltd.

With the new East Factory in full production, turnover increased by nearly 50% to a total of £3,936,386 during the year ended 30 June last, of which 31% related to exports. It is also revealed that 2,667,855 articles of all types were sold, indicating that the electric iron is still the backbone of the company's business, and Mr H. D. Drysdale, the chairman, states that toasters continued to sell well but the greatest increase in any one line has been the hair dryer. The net profit of

Year to 30 June	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1951	245,649	79,163	136	40	19/–	13/9
1952	180,677	41,083	61	40	14/7	12/7
1953	197,985	52,007	72	40	16/10	13/–
1954	329,546	90,363	84	40*	27/6	11/4
1955	487,383	203,227	157	50	35/3	25/–

*Plus 50% capital bonus.

5·3% on sales is very low. To cope with the increasing demand for the company's products a new factory of some 125,000 sq ft, alongside the existing factory, is to be built and rented. It will probably be ready early in 1957. The acquisition of Astral Equipment Ltd. in July has not yet proved as profit-earning as was hoped, due to h.p. restrictions and intensive competition. Mr Drysdale also reports that in the first three months of the current year sales have again increased.

Radio and Television Trust

There is to be no dividend for the year to 31 Mar. last—for the seventh successive year. The consolidated profit is £47,234 (*£48,086*).

Strand Electric Holdings Ltd.

During the past year approximately 40% of production was for direct export to some 70 overseas territories. The major problem at present is to cope with the volume of orders and Mr J. D. H. Sheridan, the chairman, reports that steps are in hand to improve productive

Year to 30 Apr.	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1951	275,140	22,214	37	17½	10/3	8/2
1952	294,965	22,927	38	17½	9/–	7/6
1953	268,546	17,291	27	17½	10/–	7/7
1954	302,256	23,972	38	17½	10/3	8/1
1955	328,591	27,224	24	15*	9/1	5/8

*Plus 50% capital bonus.

capacity. Fortunately, the company is in a position to take such steps without involving heavy capital expenditure.

Veritys Ltd.

An extraordinary meeting is called for 22 Nov., under the provision of the Companies Act, to consider proposals for the removal of two directors. The move is strongly opposed by the whole board, and in a notice to shareholders, Mr H. B. T. Wilde, chairman, says he believes the motion arises out of the rejection of an acquisition offer (noted on 22 Sept.). Indicating the company's improvement in recent years, Mr Wilde points out that profits have grown from £25,986 in 1951 to £54,391 last year, and asks that shareholders should reject these new proposals.

Dividends Declared

Associated Insulation Products. Interim 8% (*same*).

Garrard Engineering and Manufacturing. Interim 4% (*10%*) on capital increased by one-for-two rights issue and 150% scrip issue.

Bakelite Ltd. Interim 5% (*same*).

Rawlplug Co. Interim 10% (*same*).

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

4 Nov.—Belfast T.C. Street lighting remote control equipments and switches; and of floodlighting fittings, etc.—See 27 Oct. issue.

4 Nov.—Berwickshire. Installation in 64 houses on eight sites.—See 13 Oct. issue.

4 Nov.—Bradford. Lamps during 1956. —See 20 Oct. issue.

4 Nov.—Maidstone T.C. Installation in 12 houses on Shepway estate.—See 27 Oct. issue.

4 Nov.—Plymouth T.C. 1,930 socket outlets and 230 spur units in Council dwellings and about 1,890 electric fires.—Advertised in 20 Oct. issue.

4 Nov.—Staffordshire. Wiring at Warrington school, Rocester.—See 27 Oct. issue.

5 Nov.—Dagenham T.C. Group A and B street lighting units for conversion scheme.—See 20 Oct. issue.

5 Nov.—Inverness. Installation in 60 houses on four sites.—See 27 Oct. issue.

5 Nov.—Leeds T.C. Group A street lighting schemes in Scott Hall and Harrogate Rds. and in Easterley Rd.—Advertised in 6 Oct. issue.

5 Nov.—Ludlow T.C. Sodium lighting units along Newport-Shrewsbury trunk road.—Advertised in 13 Oct. issue.

5 Nov.—New Windsor T.C. Lamps and electric fittings and cable during 1956.—See 13 Oct. issue.

7 Nov.—Merthyr Tydfil. Pumping plant for Taf Fechan Water Board.—See 29 Sept. issue.

7 Nov.—Skipton U.D.C. Mercury vapour discharge street lighting units and steel columns for trunk road.—See 13 Oct. issue.

7 Nov.—Tonbridge (Kent) R.D.C. Wiring in houses and flats at Horsmonden, Matfield and Pembury.—See 27 Oct. issue.

8 Nov.—Lancashire. Electrical installation in Farnworth St. Peter's C.E. school. Apply by above date to County Architect, P.O. Box 26, County Hall, Preston, quoting ref. A/5550.

9 Nov.—Co. Antrim. Installation in Largymore primary school, Lisburn.—See 20 Oct. issue.

9 Nov.—Newark-on-Trent T.C. Concrete and steel columns mercury lighting equipment, for Group A lighting along trunk roads A.46 and A.17.—Advertised in 20 Oct. issue.

9 Nov.—Peterborough T.C. Supply and erection of 77 concrete columns and electrical equipment for Group B street lighting on Walton housing estate. L. H. Robjohn, City Engineer and Surveyor, P.O. Box 10, Town Hall. Deposit £2.

9 Nov.—Stoke-on-Trent T.C. Supply, erection, etc., of 30 concrete columns with fluorescent lanterns, lamps, etc., for Class installation in centres of Hanley and Burslem. City Engineer, Town Hall. Deposit £2.

11 Nov.—Aberdeen. Electrical installation in erection of police stations at Lhanbryde and Hopeman. J. Findlay, County Architect, County Buildings, Elgin.

11 Nov.—Abingdon T.C. Sodium lanterns, auxiliary gear, concrete columns, etc., for Group A lighting along trunk road A.34.—See 20 Oct. issue.

11 Nov.—Malden and Coombe T.C. Sodium lanterns on concrete columns for Group A lighting in Church Rd.—See 20 Oct. issue.

11 Nov.—Co. Meath. Installation at Dunslaughlin school.—See 27 Oct. issue.

12 Nov.—Port Talbot T.C. Class A steel columns, fluorescent and sodium discharge lamps, etc., along A.48.—See 27 Oct. issue.

14 Nov.—Bentley-with-Arksey U.D.C. Installation at 26 houses at Scawthorpe. —See 27 Oct. issue.

14 Nov.—Bournemouth T.C. Supply and erection of 411 street lighting units, with 25 ft columns, 250 W H.P.M.V. horizontal enclosed type lamps. A. Lindsay Clegg, town clerk, Town Hall.

14 Nov.—Bristol T.C. Electrically illuminated and operated signals for pedestrian crossings.—See 20 Oct. issue.

14 Nov.—Chadderton U.D.C. Street lighting lanterns of sodium, mercury, and tungsten types with control gear, etc.—See 27 Oct. issue.

14 Nov.—Lichfield T.C. Steel columns, sodium and fluorescent lanterns, for Group A lighting along A.38.—Advertised in 27 Oct. issue.

14 Nov.—N. Ireland. Separate tenders invited for electrical installation in (*a*) 160 dwellings on Redburn estate, Holywood; (*b*) 33 dwellings at Keady, Armagh; (*c*) 20 dwellings at Victoria Bridge; and (*d*) 4 dwellings at Strabane. N.I. Housing Trust, 12 Hope St, Belfast. Deposit 10s. for each scheme.

15 Nov.—Southampton T.C. Installation at Thornhill junior and infants' school.—Advertised in 27 Oct. issue.

16 Nov.—Edinburgh. Electrical maintenance work at five hospitals.—See 27 Oct. issue.

17 Nov.—Sunderland T.C. Electrical installation in eight shops and flats on Hylton Castle estate. Borough Architect, Grange Hse, Stockton Rd. Deposit £2. 2s.

18 Nov.—Blackpool. Pumping plant at Goosnargh, for Whitechapel water supply.—See 27 Oct. issue.

19 Nov.—Connah's Quay U.D.C. Supply and erection of 29 Group B concrete columns and sodium lamps with auxiliary gear and wiring for street lighting. Surveyor, Council Offices, High St. Deposit £2. 2s.—Advertised in this issue.

19 Nov.—Co. Galway. Pumping and filtration plant at Oughterard.—See 29 Sept. issue.

19 Nov.—N. Ireland. Supply of electrical equipment, including X-ray apparatus, grill boiler, food trolleys and hand blower, for Mid-Ulster Hospital Committee. Secretary, Magherafelt, Co. Londonderry.

21 Nov.—Cheadle and Gatley U.D.C. Supply of 150 Group B concrete columns and brackets for street lighting. D. S. Graham, Engineer and Surveyor, Town Hall, Brentwood, Cheadle.

21 Nov.—Middlesex. Cables for power supply, with lighting and plug circuits at Mogden purification works.—Advertised in 20 Oct. issue.

21 Nov.—Co. Offaly. Electrical installation at district hospital and clinic at Birr. County Secretary, The Courthouse, Tullamore. Deposit £6. 6s.

21 Nov.—West Riding. Electrical installation at Castleford grammar school. Apply by 14 Nov. to County Architect, Bishopgarth, Westfield Rd, Wakefield. Deposit £2. 2s.—Advertised in this issue.

28 Nov.—Fifeshire. Group A lighting at Windygates.—See 13 Oct. issue.

28 Nov.—Heckmondwike U.D.C. Supply and erection of 36 400 W mercury vapour lighting units on concrete columns along Liverpool-Leeds-Hull trunk rd, A.62. Engineer and Surveyor, Council Offices. Deposit £1. 1s.—Advertised in this issue.

23 Nov.—Rawtenstall T.C. Supply and erection of some 247 concrete columns, 140 W sodium lighting units, etc., for Group A lighting along A.56. R. H. Snowball, Town Hall. Deposit £2. 2s.

29 Nov.—Roxburghshire. Electrical installation in St. Boswells primary school. County Architect, County Offices, Newton St. Boswells.

30 Nov.—Tottenham B.C. Lamps in

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 137 queries answered this week

Graphite electrodes 200 mm dia in lengths of 1.500 to 2.000 mm, makers of in this country? R.B.—British Acheson Electrodes Ltd., Grange Mill Lane, Wincobank, Sheffield.

"Radioelectric" fires, makers of? A.S.—Falk Stadelman and Co., Ltd., 91 Farringdon Rd, E.C.1.

Butt-welding machines for copper/copper and aluminium/aluminium wire 0·036 to 0·212 in. dia, makers of? R.M.—Holden and Hunt Ltd., Cox's Lane Works; Old Hill, Staffs; British Federal Welder and Machine Co., Ltd., 130 Mount St, W.1.

"Tunion" accessories, makers of? B.M.—George Turnock Ltd., Tunion Works, Navigation St, Walsall.

"Stanley" electric tools, address for? L.E.—E. P. Barrus Ltd., 12 Brunel Rd, W.3.

ANSWERS WANTED

"Wynk-a-lyte" flasher by the Betts and Betts Corpn. of New York, agents for? L.E.

Accumulator filler, for distilled water, with a signal lamp to indicate when full, makers of? I.B.

year from 1 Apr., 1956.—See 27 Oct. issue.

1 Dec.—Belfast T.C. Supply of various workshop equipment at first extension of power station West. Tender form N.1758. Merz and McLellan, consulting engineers, Carliol Hse, Newcastle-on-Tyne. Deposit £5. 5s.—Advertised in this issue.

1 Dec.—Cheshire. Approved lists of contractors are being compiled.—See 27 Oct. issue.

2 Dec.—Mablethorpe and Sutton U.D.C. Electrically-operated submersible pumps with switchgear, etc., at Maltby pumping station.—See 27 Oct. issue.

3 Dec.—Lincoln. Land drainage pumps and electric motors, etc., for Upper Witham Internal Drainage Board.—See 20 Oct. issue.

5 Dec.—Leeds T.C. Electrically-driven centrifugal pumps with motors and switchgear for Headingley filtration works pumping station.—See 6 Oct. issue.

12 Dec.—Easthampstead R.D.C. Group A and B street lighting units.—Advertised in 13 Oct. issue.

11 Jan.—Dublin T.C. Sewage pumps and electric motors and storm water pump and electric motor for Kilbarrack pumping station.—See 27 Oct. issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

21 Nov.—India. Tenders invited (enquiry No. 13690) for 1,500 kVA transformer unit, 3-phase, 50 c/s, 66/33 kV delta-13·2 kV star outdoor with accessories for Indian Telephone Industries. Stores Purchase Committee, Govt. of Mysore, Asiatic Building, Kempegowda Rd, Bangalore. B.o.T. (Ref.: ESB 22720/55).*

22 Nov.—Australia. Manufacture, supply etc. of two electrically driven vertical spindle centrifugal type unlined pumping units with automatic starting equipment, bearings, couplings, etc. Contract 3157-S. Metropolitan Water Sewerage and Drainage Board, Sydney, N.S.W. B.o.T. (Ref.: ESB 22409/55).*

23 Nov.—Egypt. Supply of large oil circuit-breakers, current transformers and secondary protective relays for 3-phase 11 kV unearthed subtransmission system at 50 c/s. Cairo Electricity and Gas Admin., 26 July St, Cairo. B.o.T. (Ref.: ESB 22731/55).*

23 Nov.—India. High tension switchgear required for Porbandar, Surendranagar, Gondal, Morvi, and Rajkot and pole mounted transformer substations. Chief Engineer, Madras Port Trust. B.o.T. (Ref.: ESB 22774/55).*

25 Nov.—South Africa. Total of 6,736,400 ft of electrical signalling cable required by Stores Dept. of S. African Railways, Johannesburg. Tender No. C.5323. B.o.T. (Ref.: ESB 23305/55).*

25 Nov. — South Africa. Tenders (C.5363) invited for supply of 45 items of electrical signalling material. Stores Dept., S. African Railways, Johannesburg. B.o.T. (Ref.: ESB 22122/55).*

29 Nov.—Egypt. Supply of 30 500 kVA, and 70 300 kVA, and 3-phase 10500/380/220 V transformers. Cairo Electricity and Gas Admin., 26 July St, Cairo. B.o.T. (Ref.: ESB 22797/55).*

29 Nov.—U.S.A. 115 kV and 230 kV electrical equipment for Dallas Dam power station, including lightning arresters, bus insulators, disconnect switches. Invite No. CIVENG-35-026-56-58. District Engineer, Corps of Engineers, U.S. Army, 628 Pittock Block, Portland 5, Oregon. B.o.T. (Ref.: ESB 22250/55).*

30 Nov.—Rhodesia and Nyasaland. Transmission work in Kariba scheme involving about 900 miles of 330 kV single circuit, flat spacing steel tower transmission lines. Apply to Secretary, Federal Hydro-Electric Board, P.O. Box 630, Salisbury, by above date, with copy to consulting engineers, Merz and McLellan, Carliol Hse, Newcastle-on-Tyne.—Advertised in this issue.

7 Dec.—S. Rhodesia. Supply of 3-phase oil immersed air natural cooled, outdoor type 11000/400 V Delta/Star transformers with accessories: eighteen 30 kVA, thirty-six 50 kVA and twelve 100 kVA. Contract E197/1955. City Electrical Engineer, Bulawayo. B.o.T. (Ref.: ESB 22745/55).*

14 Dec.—New Zealand. Post and Telegraph Dept. invites tenders (P. and T. 157/328) for 30,500 ft of cable and conductors. Stores Div., Windsor Building, Willis St, Wellington. B.o.T. (Ref.: ESB 23411/55).*

15 Dec.—India. Supply of 132 kV and 66 kV transformers and a synchronising panel for Tadepalli and Renigunta substations. Specif. A.206, Superintending Engineer, 20 Rutland Gate, Nungambakkam, Madras 6. B.o.T. (Ref.: ESB 23276/55).*

17 Dec.—Tangier. Water and Electricity Board require electrical equipment and h.t. 5·5 kV feed. Board is at 89 Rue de Foucauld, 1ere etage Tangier. B.o.T. (Ref.: ESB 21606/55).*

21 Feb.—New Zealand. Supply of 30,000 kVA 66/11 kV tapchanging oil immersed outdoor type transformer bank and spare unit for Bromley substation. Contract 294. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 21991/55).*

28 Feb.—New Zealand. Manufacture, supply of either 12 66 kV 1,500 MVA, or 12 66 kV 1,000 MVA, 800 amp three-phase circuit-breakers and accessories for Hororata substation. Contract 297. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 23295/55).*

6 Mar.—New Zealand. Manufacture, supply, etc., of four single-phase, double wound transformer units, each 3,333 kVA 11/19·05 kV 50 cycles outdoor type, oil immersed, natural cooled and tap changing on load, for Managhas power station. Contract 296. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 23294/55).*

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 1 November

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	367½	+10½	280
„ (3 months)	354	+9½	260½
R.S.T. (Rhodesian Selection Trust) group price*	360	—	—
LEAD, refined pig, min. 99·97% purity (cash)	106¾	−¼	108
„ (3 months)	106½	−½	102¾
TIN, refined, min. 99·75% purity (settlement)	780	+13	731
„ (3 months)	759	+6	728
ALUMINIUM, ingots 99·99·5%	171	—	150
ZINC, virgin, min. 98% purity (cash)	90¾	−¼	81¾
„ (3 months)	90⅝	−¼	81½
RUBBER No. 1, RSS. spot (per lb.)	34½d.	−1 1/16d.	23 3/16d.
„ c.i.f. basis, ports. Dec. (per lb.)	34d.	−1 1/16d.	23 3/16d.
ARMOURING :			
Galv. Steel Wire (0·104 in.)	56¾	—	52½
Mild Steel Tape (0·04 in.)	43¼	—	40½

(*Fixed price c.i.f. U.K., now subject to change at 24 hours' notice, to "consumers willing to instil a degree of stability into the resale price.")

Gazette Announcements

COMPANIES ACTS

Rentalec Ltd. Last day for receiving proofs in respect of intended dividends, 12 Nov. Liquidator is F. M. Collins, Official Receiver and Liquidator, Inveresk Hse, 346 Strand, London, W.C.2.

H. G. Barnett and Partners Ltd. Meetings of creditors and contributories will take place at Official Receiver's Office, 20 Byrom St, Manchester, on 9 Nov. at 10.30 a.m. and 11 a.m. resp.

Robson and Joisce Ltd. Resolution for voluntary winding-up passed at meeting on 15 Oct. when J. Lamb, 1 Newgate St, Newcastle-on-Tyne, was appointed liquidator.

BANKRUPTCY ACTS

Receiving Orders

London. W. Zack, electrical contractor of 111 Lordship Rd, Stoke Newington, N.16. Receiving order dated 19 Oct.

Southend. G. E. Stephens, electrical contractor of 142 Old High St, Grays. Date of receiving order, 19 Oct.

Liverpool. William J. Incledon, electrical engineer trading at 203 West Derby Rd, Liverpool. Date of receiving order, 25 Oct.

Public Examinations

Burnley. Kenneth Hanson, trading as Hanson's Electronics at 2 Hall St, and 1 Parker Lane, Burnley. Public exam. will be at the Court House, Bankhouse St, Burnley, on 10 Jan., at 11 a.m. First meeting was on Tuesday (1 Nov.).

Wigan. Henry Parkinson, trading as Electrolite Engineers at 9 Market St, Wigan. Public exam. will be at 10.30 a.m. on 1 Dec. at the Court House, Crawford St, Wigan. First meeting took place yesterday (2 Nov.).

Appointment of Trustee

Bristol. Enfield W. White, electrical contractor, of 5 Greenfield Rd, Southmead. Trustee is P. W. Hort, C.A., 28 Baldwin St, Bristol 1.

Bradford. Keith M. Ashworth and Derek Revell, trading as Ashworth and Revell, electrical contractors, at 265 Bradford Rd, Frizinghall, and 120 Otley Rd, Shipley. Trustee is G. E. Rushton, incorp. acc., 36 North Parade, Bradford.

Release of Trustee

Boston. Peter A. Cockcroft, radio and electrical engineer trading at Brook Hse, Penrhyn Ave, Rhos-on-Sea, Denbigh. Trustee was E. C. Simpson, Official Receiver, 27 Regent St, Park Row, Nottingham.

BUSINESS PROSPECTS

Home

Ashby Woulds U.D.C. Construction of 60 houses on Norris Hill site, Moira. Council Architects are Pick, Everard, Keay and Gimson, 6 Millstone Lane, Leicester.

Banffshire. Revised plans approved for secondary school at Kewth. Cost estimated at £262,000. Also approval sought for £136,550 secondary school at Maeduff.

Barry (Glam). S. Thomas of Metropolitan Bank Chambers, 26 Commercial St, Newport, will probably be appointed consultant architect for development of Colcot shopping centre.

Batley T.C. Construction of 72 houses on New Purlwell estate. Borough Engineer, West Hse, Hanover St.

Brighton T.C. Erection of 17 flats and 17 maisonnettes in three blocks in Essex St, Borough Engineer and Surveyor, 26-30 King's Rd.

Bury St. Edmunds. New factory to be built on municipal trading estate for Van Melle of Rotterdam. Quantity surveyors are Thurgood, Son and Chidgey, 2 Broad St Buildings, London, E.C.2.

Cardiff. Industrial research station planned by Richard Thomas and Baldwins Ltd. on Llanishen industrial estate. Sir Percy Thomas and Son, 10 Cathedral Rd, are architects.

Castlereagh (N.I.) R.D.C. Construction of 62 houses off Cregagh Rd. Council Office, 51 Lisburn Rd, Belfast.

Chatham T.C. Erection of 80 houses on Weeds Wood estate and 22 on Wayfield estate. J. A. T. Richards, Engineer and Surveyor, Town Hall.

Consett. British Oxygen Engineering Co., Ltd., Vigo Lane, Chester-le-Street, propose factory at Consett Junction Bridge.

Croydon T.C. Next year's school building programme will include Norbury Manor secondary girls (£148,104); and Archbishop Tenison's C.E. Selective secondary (£98,760).

Doncaster. Work to begin next year on extensions at Royal Infirmary for Sheffield Hospital Board. Cost estimated at £2,100,000. Architects are Pite, Son and Fairweather, 6 Queen Anne's Gate, Westminster.

Dundee. Tenders being invited for building work for spinning mill at Douglasfield works of Jute Industries Ltd. Consulting engineers are Sir Alexander Gibb and Partners, Queen Anne's Lodge, Westminster. Estimated cost £500,000.

East Sussex. Erection of Haywards Heath grammar technical school. County Architect, County Hall, Lewes.

Essex. Erection of Basildon Woodlands and Brentwood South secondary modern schools. H. Conolly, County Architect, County Hall, Chelmsford.

Felling (Dur). Cinema to be built on Leam Lane estate for A. Woolf. Architects are Stephenson, Gillis and Partners, Saville Chambers, North St, Newcastle.

Hampshire. Construction of secondary schools at Whitehill Bordon, Petersfield and Romsey, and of junior schools at Fareham Pk, Havant Front Lawn and Fawley Blackfield. County Architect, The Castle, Winchester.

Lincolnshire. Alterations and improvements to technical college at Grantham are estimated to cost £120,000. Also four-storey block and assembly hall proposed at Lincoln technical college.

Maesteg U.D.C. Construction of 40 houses on Parc estate. L. W. Jones, Engineer and Surveyor, Council Offices, Talbot St.

Maidstone. Plans submitted for 3-storey factory, offices, etc., in Sandling Rd, Eastgate, by Chamberlain and Co., Ltd.

Newcastle-on-Tyne. Luxury hotel in new road parallel with Northumberland St. contemplated by Cussins (Contractors) Ltd., The Drive, Gosforth. Proposed hotel is 8 storeys with 300 bedrooms.

Newport (I.o.W.) T.C. Approval given to installation of electric light in 292 council houses. Cost will be about £2,900.

N. Ireland. Construction of 18 dwellings at Coulig (Co. Down), 87 at Lisburn (Co. Antrim) and 12 at Hilden (Co. Antrim). N.I. Housing Trust, 12 Hope St, Belfast.

Radnorshire. Plans approved for school estimated to cost £150,000 at Llandrindod Wells.

St. Pancras. Scheme approved for erection of extension to Haverstock county secondary school. Cost estimated at £179,240.

Shoreditch. Scheme approved for county secondary school in Hoxton Hse area. Estimated cost £403,810.

Southport T.C. Erection of 97 dwellings on Burnley Rd estate, Ainsdale. Borough Architect, 99-105 Lord St.

Southwick U.D.C. Erection of 26 flats at The Drive, Engineer and Surveyor, Town Hall.

Tynemouth T.C. Erection of 54 dwellings in four blocks in East End of North Shields. A. K. Tasker and Austin Child, chart. arch., 25 New Bridge St, Newcastle.

Walton and Weybridge U.D.C. Erection of 74 houses on Hersham Rd estate. Engineer and Surveyor, Council Offices, Walton-on-Thames.

Wardle (Lancs) U.D.C. Erection of 26 houses on Ashbrook estate. E. K. Gration, clerk of council, Council Offices, Wardle Rd, Rochdale.

Overseas

Guatemala. Electrical materials and other miscellaneous items (including wire, conduit, insulating compound and switches) required for technical training school of U.N.E.S.C.O., who are at Apartado 244, Guatemala City.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

C. C. Shackleton and Sons Ltd., 101 Regent St, Kingswood, Glos. To take over business of "C. C. Shackleton" carried on at Kingswood, Glos, by Chas. C. Shackleton, electricians, radio, television and refrigeration plant manufacturers, etc. Nom. cap.: £15,000. Dir.: C. C. Shackleton.

Charles Sambridge (Candelabra) Ltd., Nithsdale, Ingatestone, Essex. Manufacturers of and dealers in electric fittings, etc. Nom. cap.: £1,000. Dirs.: C. B. Sambridge and S. E. Dale.

E. and A. Perry Ltd., Electromotive Works, Trench Rd, Trench, Wellington, Salop. To take over business of electromotive engineers carried on at Trench, Wellington, by Alfred J. and Samuel E. Perry. Nom. cap.: £5,000. Dirs.: S. E. Perry and A. J. Perry.

Mitchells (Ovenden) Ltd., 155/157 Ovenden Rd, Ovenden, Halifax. Wireless, television, electrical, refrigeration, heating, lighting, mechanical and general engineers, etc. Nom. cap.: £2,000. Dirs.: E. Mitchell and Mrs A. Mitchell.

G. L. Wright and Co. (Goole) Ltd., 43 Boothferry Rd, Goole, Yorks. Electrical engineers and contractors, wireless, radio and television engineers, etc. Nom. cap.: £3,000. Dirs.: J. M. Jackson, Frances A. Jackson, G. L. Wright and Dorothy Wright.

Edwin A. Sims Ltd., Radio Hse, Swan St, Warwick. Manufacturers of and dealers in electrical and mechanical apparatus and accessories, etc. Nom. cap.: £5,000. Dirs.: E. A. Sims and Mrs D. M. Sims.

Cheb Ltd., 34 Thameshill Ave, Romford, Essex. Electrical equipment specialists, etc. Nom. cap.: £500. Dirs.: D. E. Cowling, A. V. Holdsworth, and E. Bertin.

Teleco Electronics Ltd, Manufacturers of and dealers in electrical, radio and television apparatus, etc. Nom. cap.: £1,000. Dirs.: not named. Subs.: E. D. Roff, 31 Morley Court, Kingsbury, N.W.9; J. D. Parker, 59 Finchley Lane, N.W.4, and R. E. Dubery, 23 Brixham Hse, S.W.18.

Bradnick and Co. Ltd., National Provincial Bank Chambers, Five Ways, Birmingham 15. Manufacturers of and dealers in electrical goods of all kinds, wireless and television sets, etc. Nom. cap.: £2,000. Dirs.: D. C. Bradnick and Mrs B. M. Bradnick.

Chapman Anderson Ltd., Salisbury Sq Hse, Salisbury Sq, E.C.4. Electricians, mechanical engineers, etc. Nom. cap.: £100. Dirs.: J. C. Anderson and Mrs M. Anderson.

Doulton Industrial Porcelains Ltd. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: O. Sherwood Doulton and T. A. Wright, Doulton Hse, Albert Embankment, S.E.1.

Trade Notes

Change of Address. The Nevelin Electric Co., Ltd., have moved to a newly acquired factory in Surrey on a 30-acre site. The new address is: Hurst Green, Oxted, Surrey. Telephone: Oxted 1450.

The London office of Danfoss Manufacturing Co. is now at 13, Queensway, W.2. Telephone: Bayswater 1633.

Service. From Nov. 1 clients can obtain supplies of Mersey cables from the various branches of the associate company, the Simplex Electric Co., Ltd. Existing supply arrangements in Birmingham and Glasgow are unchanged.

Agency. Cantie Switches Ltd. have appointed Robert Gadmany and Son Ltd., 33 Queen St, Belfast (Telephone: Belfast 23811), as their agents in Northern Ireland and Eire. This is a newly registered company under the managing directorship of Mr T. M. Calvert to carry on the business of the late Mr R. Gadmany who acted as agent for Cantie Switches Ltd. for many years.

Factory Site. Leicester City Council have agreed to sell a 20 acre factory site on the old Braunstone airfield for £55,000 to British Thomson-Houston Co., Ltd., for the erection of a factory for the manufacture of electronic equipment

MEETINGS TO NOTE

THURSDAY, 3 NOV.

I.E.E. (London). "New High-Frequency Transmitting Station at Rugby." Capt. C. F. Booth and B. N. MacLarty. Savoy Place, W.C.2, 5.30 p.m.

I.E.S. (Cardiff). "Problems of Production Lighting in TV Studios." R. de B. McCullough. Elect. Offices, The Hayes, 5.45 p.m.

I.E.S. (Glasgow). "Maintenance of Lighting Installations." J. W. Strange and W. Robinson. 39 Elmbank Cresc, 6.30 p.m.

I.E.S. (Nottingham). "Lighting of Hazardous and Corrosive Locations in Industrial Plants." W. E. Harper and A. G. Palmer. Elect. Offices, Smithy Row, 6 p.m.

CHELMSFORD ENGRNG. SOC. "Kemano Hydro-Electric Development and Kitimat Aluminium Reduction Works." F. L. Lawton. Hoffman's Hall, 7.30 p.m.

BRITISH INSTN. OF RADIO ENGS. (N. Western). "Ground Controlled Approach and Instrument Landing System." R. H. James and N. MacKinnon. College of Technology, Sackville St, Manchester, 6.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Birmingham). Film evening including two by Babcock and Wilcox and one by Dewrance. Engineering Centre, Stephenson Place, 6.30 p.m.

A.S.E.E. (S. London). "Electricity in Operating Theatres." Half Moon Hotel, Broad Green, Croydon, 8 p.m.

FRIDAY, 4 NOV.

ASSOC. OF ELECT. MACHINERY TRADES. Annual ball at Savoy Hotel, London.

E.C.A. (London). Annual dinner and dance at Grosvenor Hse, Park Lane, London.

A.S.E.E. (N.W. London). Branch dinner and dance at Century Hotel, Wembley Park, 7.30 p.m.

A.S.E.E. (Liverpool) "Electrostatic Precipitation." J. A. Quarrington. Engrng. Soc., 9 The Temple, 24 Dale St, 7.30 p.m.

JUNIOR INSTN. OF ENGINEERS (London) Film evening on diesel electric locomotives. Pepys Hse, 14 Rochester Row, Westminster, 7 p.m.

MANCHESTER ASSOC. OF ENGRS. "Management of Men." Rt Rev W. D. L. Greer. Engineers' Club, Albert Sq, 6.45 p.m.

SATURDAY, 5 NOV.

I.E.E. (London Students). Joint dance with Civils and Mechanicals, at Victoria Halls, Bloomsbury Sq, W.C.1, 7.30 p.m.

MONDAY, 7 NOV.

I.E.E. (London Education). Discussion on "Langrange's Principle as Basis of a Unified Treatment of Action of Electrical Indicating Instruments." D. Rutenburg. Savoy Place, W.C.2, 6 p.m.

I.E.E. (Mersey and N. Wales). "Standardisation of Retail Electricity Tariffs" A. O. Johnson and N. F. Marsh. Liverpool Royal Instn., Colquitt St, 6.30 p.m.

I.E.E. (N.E. Radio and Measurements). "An 8-MeV Linear Accelerator for X-Ray Therapy." C. W. Miller. King's College, Newcastle, 6.15 p.m.

I.E.E. (S. Midland). "Electrification of Manchester-Sheffield-Wath Lines." J. A. Broughall and K. J. Cook. James Watt Inst., Great Charles St, Birmingham, 6 p.m.

I.E.E. (S. Western). Meeting at Cornwall Tech. College, Trevenson, Camborne, 7 p.m.

I.E.S. (Leeds). "Some Developments in Fluorescent Lighting." H. H. Ballin. Elect. Offices, Ferensway, Hull, 7 p.m.

N.E. ELECTRICAL CLUB. "Oil, Fuel and Smog." H. W. Hastings. County Hotel, Neville St, Newcastle, 6.30 p.m.

SOC. OF ENGINEERS. "Investigation into Design of Superstructure of Power Station." C. W. E. Dudley. Geological Soc., Burlington Hse, London, W.1, 5.30 p.m.

A.S.E.E. (Leeds). "Colour Psychology." Great Northern Hotel, 7.30 p.m.

A.S.E.E. (N.E. London). "Any Questions?" Angel Hotel, Ilford, 8 p.m.

A.S.E.E. (Sheffield). "Radio Frequency Heating." J. Pound. Royal Victoria Station Hotel, 7.30 p.m.

E.P.E.A. (London). "Quick Starting of Turbines." P. F. Carson, Caxton Hall, Westminster, 7 p.m.

TUESDAY, 8 NOV.

I.E.E. (London). Measurement and Control Section dinner at Cafe Royal.

I.E.E. (E. Midland). "Electrification of Manchester-Sheffield-Wath Lines." J. A. Broughall and K. J. Cook. Elect. Showrooms, Derby, 6.30 p.m.

I.E.E. (Cambridge Radio). Chairman's address by H. Stanesby. Cavendish Lab., 8.15 p.m.

I.E.E. (N. Midland). Discussion on "Varying Methods of Educating Electrical Engineers." Elect. Offices, 1 Whitehall Rd, Leeds, 6.30 p.m.

I.E.E. (N. Ireland). "Maintenance Principles for Automatic Telephone Exchange Plant." R. W. Palmer. Queens Univ., Belfast, 6.30 p.m.

I.E.E. (N. Scotland). "Thermionic Valves of Improved Quality for Govt. and Industrial Purposes." E. G. Rowe, P. Welch and W. W. Wright. Caledonian Hotel, Aberdeen, 7.30 p.m.

I.E.S. (London). "Efficiency of Fluorescent Lamps." F. Jackson. Lighting Service Bureau, Savoy Hill, W.C.2, 6 p.m.

INSTN. OF WORKS MANAGERS (Birmingham). "Electronic Computors in the Office." Engineering Centre, Stephenson Place, 7 p.m.

INCORP. PLANT ENGINEERS (Manchester). Films: "Power without Smoke," and "Distinguish Company," by Brook Motors. Engineers Club, Albert Sq, 7.15 p.m.

WEDNESDAY, 9 NOV.

I.E.E. (London Radio). "Transistor Digital Fast Multiplier with Magneto-Strictive Storage." G. B. B. Chaplin, R. E. Hayes and A. R. Owens. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N.W. Radio). "High-Speed Electronic Analogue Computing Techniques." D. M. MacKay. Engineers' Club, Albert Sq, Manchester, 6.45 p.m.

I.E.E. (N. Scotland). "Thermionic Valves of Improved Quality for Govt. and Industrial Purposes." E. G. Rowe, P. Welch and W. W. Wright. Queen's College, Dundee, 7 p.m.

I.E.E. (Rugby). "Automatic Circuit Reclosers." G. F. Peirson, A. H. Pollard and N. Care. College of Technology and Arts, 6.30 p.m.

I.E.E. (Oxford). "Lightning Surges on Electrical Supply Systems." R. H. Golde. Elect. Offices, 37 George St, 7 p.m.

I.E.E. (N. Lancs). "Proving Performance of Circuit-Breakers, especially those of Large Breaking Capacity." J. Christie, H. Leyburn and J. F. Bird; "New Testing Station for High-Power Circuit-Breakers." J. Christie, H. Leyburn and R. W. Fenn. Elect. Offices, North Rd, Lancaster.

I.E.S. (Leeds). "Modelling with Light and Colour." J. W. Howell. Y.M.C.A., 16 John William St, Huddersfield, 7 p.m.

I.E.S. (Newcastle). "Architect's Approach to Artificial Lighting Design." G. Grenfell Baines. King's College, 6.15 p.m.

INST. OF FUEL (London). "Chimneys and Dispersal of Smoke." J. E. Hawkins and G. Nonhebel. Instn. of Civil Engrs., Great George St, S.W.1, 5.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (N. Eastern). "Turret Tuners for Multi-Channel TV Reception." R. Holland. Neville Hall, Newcastle, 6 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Merseyside). "Dekatron Tube in a Digital Transmission System." G. Shand. Chamber of Commerce, 1 Old Hall St, Liverpool, 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (W. Midlands). "Closed Circuit Industrial TV." H. A. McGhee. Technical College, Wulfruna St, Wolverhampton, 7.15 p.m.

INCORP. PLANT ENGINEERS (E. Midlands). "Atomic Energy and the Future." J. A. Dixon. County Hotel, Nottingham, 7 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (London). Symposium on Corrosion. D. G. Lewis, H. Campbell, P. Hamer and F. Wormwell. Instn. of Mechanical Engrs., Birdcage Walk, S.W.1, 5.30 p.m.

A.S.E.E. (S.W. London). "Electronics in Industry." Dr L. E. C. Hughes. Guild Hse, Worple Rd, Wimbledon, 8.15 p.m.

A.S.E.E. (Halifax). Film Show provided by American Embassy. Crown Hotel, Horton St, 7.30 p.m.

A.S.E.E. (Birmingham). "Roller Bearing Applications." C. S. Clarke. Chamber of Commerce, New St, 7.15 p.m.

A.S.E.E. (York). "Electrical Equipment of Motor Vehicles." Shambles Cafe, 7.15 p.m.

THURSDAY, 10 NOV.

I.E.E. (London). "Germanium and Silicon Power Rectifiers." T. H. Kinman, G. A. Carrick, R. G. Hibberd and A. J. Blundell. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Swansea). "Design, Performance and Application of Miniature Circuit-Breakers." H. W. Wolff and T. G. F. Atherton. Elect. Showrooms, The Kingsway, 6 p.m.

I.E.S. (Birmingham). Ladies' night at Botanical Gardens Ballroom, Westbourne Rd, Edgbaston.

BRITISH INSTN. OF RADIO ENGRS. (Scottish). "Applicants of Electronics to Marine Echo-Sounding." F. Baillie, 39 Elmbank Cresc., Glasgow, 7 p.m.

INCORP. PLANT ENGRS. (Glasgow). "Modern Textile-drying Methods." K. S. Laurie. Building Centre, 425 Sauchiehall St, 7 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Liverpool). "Embedded Panel Warming." F. Maguire. College of Buildings, Clarence St, 6.30 p.m.

I.E.E. (Bristol Students). "Vacation Training in Canada." H. M. Jenkins. Elect. Hse, Colston Ave, Bristol, 7 p.m.

FRIDAY, 11 NOV.

I.E.E. (N. Midland Utilisation). "Timing the Operation of Control Systems Associated with Rotating Equipment," C. Cuthbert and D. A. Picken; "Dynamic Braking of Induction Motors." D. Harrison. Elect. Offices, 1 Whitehall Rd, Leeds, 6.30 p.m.

I.E.E. (S.E. Scotland). "Outline of Developments in Electric Power Stations." C. W. Marshall. North British Station Hotel, Edinburgh, 6.30 p.m.

I.E.E. (Swansea). Annual dinner and dance at Osborne Hotel, Langland Bay, 7 p.m.

E.P.E.A. (S. Meter Engrs.). "Relays for Network Protectors." W. Salter. Caxton Hall, Westminster, 6.30 p.m.

ELECTRICAL INDUSTRIES BALL in aid of E.I.B.A. at Grosvenor Hse, Park Lane, London.

A.S.E.E. (N.E. London). Annual dinner at Angel Hotel, Ilford.

A.S.E.E. (W. England). "Back Pressure Steam Turbines." D. N. de Mattos. Grand Hotel, Bristol, 7.30 p.m.

A.S.E.E. (Stoke and Crewe). Films: "Steel and Atomic Energy." Royal Hotel, Crewe, 8 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

August Sun in design. 743,964. Class 10. Medical lamps. D.A.L. (Engrs.) Ltd. 1 1st Ave., Bracklesham Bay, near Chichester.

Constellation. 740,735. Class 9. Domestic cleaning appliances. Hoover Ltd., Perivale, Greenford, Middx.

Dryad. 742,428. Class 11. Hair drying appliances. Bylock Electric Ltd., 109 South St, Enfield, Middx.

Ersion. 743,797. Class 9. Electrical apparatus, etc. E.R.S. (London) Ltd., 159 Brookwood Rd, S.W.3.

Scinflex. 743,917. Class 9. Electrical apparatus, etc. Plessey Co., Ltd., 56 Vicarage Lane, Ilford, Essex.

Vue-gene. 743,735. Class 7. Hair drying machines. Eugene Ltd., 143/147 Regent St, W.1.

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In all businesses there are some men who do what they need to, others who do their best, and a few eager beavers.

HENLEY's have more than their fair share of eager beavers—men who will go miles to help a customer. In fact it is a management policy with HENLEY's both to employ and encourage eager beavers. To support them HENLEY's hold stocks of thousands of miles of rubber and thermoplastic cables of every kind at 28 branches.

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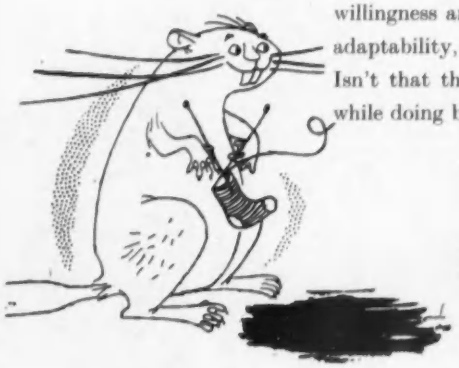

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CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all their classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

TENDERS are invited for the Renewal of the Electrical Installation at Castleford Grammar School.

Applications to tender must be received by the County Architect, Bishopgarth, Westfield Road, Wakefield, not later than 14 Nov., 1955.

Plans and Specification, together with Conditions of Contract and Form of Tender are available on payment of a deposit of £2. 2s. which will be returned on receipt of a bona fide tender. Cheques must be made payable to the "West Riding Treasurer" and crossed "& Co."

The Contract will be under the County Council's General Conditions of Contract.

Sealed Tenders must be received by me at Room 3, County Hall, Wakefield, not later than 12 noon on 21 Nov., 1955.

BERNARD KENYON,
County Hall, Clerk of the County Council,
Wakefield. (V 725)

URBAN DISTRICT COUNCIL OF CONNAH'S QUAY

STREET LIGHTING

TENDERS are invited for the supply and erection of 29 Nos. Group B Lighting concrete columns and sodium lamps, together with auxiliary gear and wiring.

Specification and form of tender may be obtained from the Surveyor, Council Offices, High St, Connah's Quay, on payment of £2. 2s. to be refunded on receipt of bona fide tender.

Tenders, in plain sealed envelopes, endorsed "Tender—Street Lighting" to be delivered to the undersigned on or before 19 Nov., 1955.

The Council are not bound to the lowest or to accept any tender.

L. WILLIAMS,
Council Offices, Clerk of the Council.
Connah's Quay.
25 Oct., 1955. (V 678)

HECKMONDWIKE URBAN DISTRICT COUNCIL

TRUNK ROAD LIGHTING
LIVERPOOL-LEEDS-HULL TRUNK ROAD A62

TENDERS are invited for the supply and putting into commission of 36 No. 400 W Mercury Vapour Lighting Units mounted on 25 ft Reinforced Concrete Standards along the length of Trunk Road from the Spenborough boundary at Six Lane Ends to the Batley Boundary at White Lea.

For the purpose of tendering, the work is divided into three Sections:

1. Supply only of Electrical Equipment (Lanterns, Lamps, Central Gear and Time Switches).
2. Supply and erection of Columns, together with fitting and Wiring of Equipment offered in Section 1.
3. Supply and erection of Columns together with fitting and wiring of Equipment supplied by another Firm.

Tenders may be submitted for any or all parts.

continued in next column

continued from previous column

Forms of Tender, Specifications and Bills of Quantities may be obtained from the Engineer and Surveyor, Council Offices, Heckmondwike, on receipt of deposit of £1. 1s. Documents returnable to the undersigned before noon on Monday, 28 Nov., 1955.

Drawings may be inspected at the Engineer and Surveyor's Office during normal Office hours.

The Council does not bind itself to accept the lowest or any tender and reserves the right to accept the whole or part only of the Tender.

GEORGE HOLT,
Clerk of the Council.
26 Oct., 1955. (V 686)

ELECTRICITY (ESSENTIAL SUPPLIES) ACT (N.I.) 1954

City and County Borough of Belfast
Electricity Department

TENDERS are invited for the Supply and Delivery at the First Extension, Belfast Municipal Electric Power Station West, of:

Workshop Equipment comprising 14½ in., 7½ in., and 3½ in. centres heavy duty Lathes, 5 ft Radial Drilling Machine, Metal Cutting Band Saw, ½ in. Column Type Drilling Machine, 4 in. Universal Screwing Machine, 24 in. Shaping Machine, 45 in. x 11 in. Universal Milling Machine, 10 in. x 10 in. Hacksawing Machine, a Single Operator Motor Generator Welder Plant, two Combined Oxy-acetylene Welding and Cutting Outfits, Two Grinding Machines, Miscellaneous Vices and Mechanics' Benches.

Form of Tender (N.1758), Conditions and Specifications, in quintuplicate, may be obtained from Messrs Merz and McLellan, Consulting Engineers, Carliol House, Newcastle upon Tyne 1, on payment of a deposit of Five Guineas which will be refunded provided a bona fide tender is lodged and not withdrawn. Extra copies of the tender document may be obtained at One Guinea each; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope, marked "Tender for Workshop Equipment, Electricity Department" and endorsed with the name and address of the tenderer must be addressed to the Town Clerk, City Hall, Belfast, so as to reach him not later than 4 p.m. on Thursday, 1 Dec., 1955.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

C. A. R. SHILLINGTON,
Chairman,
Northern Ireland Joint
Electricity Committee.

Chichester House,
Chichester St, Belfast. (V 724)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

THE NORTH WESTERN ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER (TESTING) TECHNICAL ENGINEER'S SECTION, CHIEF ENGINEER'S DEPARTMENT, AREA BOARD HEADQUARTERS

DUTIES will include assistance in the testing of all equipment used on a distributing system. Applicants should preferably hold the H.N.C. in Electrical Engineering or its equivalent.

Salary Scale: £475/£630 per annum, Class AX/EX 7, N.J.B. Conditions.

Applications to Establishment Officer, the North Western Electricity Board, Cheetwood Rd, Manchester 8, by 12 Nov., 1955.

N.B.—Persons who applied in response to the previous advertisement of this post need not re-apply.

THIRD ASSISTANT ENGINEER (BUILDING & CIVIL ENGINEERING) SUB-AREA ENGINEER'S DEPARTMENT, OLDHAM

Applicants should have proved organising ability and be capable of supervising a building section engaged on the design, estimating, erection and maintenance of substation, workshop, office and Service Centre buildings. Preference will be given to applicants possessing appropriate qualifications.

Salary Scale: £790 x £20—£850 per annum Grade K.10, N.J.B. Conditions.

FOURTH ASSISTANT DISTRICT ENGINEER, OLDHAM

Duties include assisting in supervision of the Construction, Operation and Maintenance of the distribution system within the Oldham District. Applicants should have had experience in this work on underground cables and overhead lines up to and including 33 kV.

The successful applicant will be required to undertake standby duties and to reside within the District.

Preference will be given to applicants in possession of the H.N.C. in Electrical Engineering or equivalent qualification.

Salary Scale: £635 x £15—£680 per annum Grade G.11, N.J.B. Conditions.

Applications for the above posts to Sub-Area Manager, No. 3 Sub-Area, the North Western Electricity Board, Union St, Oldham, by 12 Nov., 1955.

GENERAL ASSISTANT ENGINEERS (BARROW AND CARLISLE TESTING STATIONS)

The successful applicants will be required to assist in general testing duties (meters, relays and instruments) in the Testing Department at the Barrow or Carlisle Testing Station.

Applicants should possess the H.N.C. in Electrical Engineering, but consideration will be given to applicants in possession of the O.N.C. who are progressing towards obtaining their H.N.C.

Salary Scale: £475 x £15—£520 per annum Grade J.17, N.J.B. Conditions.

Applications to Sub-Area Manager, No. 6 Sub-Area, the North Western Electricity Board, Castle Green, Kendal, by 12 Nov., 1955.

N.B.—Persons who applied in response to the previous advertisement of this post need not re-apply. (V 708)

SOUTH WALES ELECTRICITY BOARD

require FIRST ASSISTANT to the Commercial Manager, District 348 (Cardiff West), Central Sub-Area.

Salary—Class E, Grade 5 (£790/£850) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience and three referees, to be addressed to the Secretary (Establishments Section) to arrive by 12 Nov., 1955.

D. G. DODDS,
St. Mellons, Secretary.
Cardiff. (V 715)

LONDON ELECTRICITY BOARD

SENIOR AND ENGINEERING DRAUGHTSMEN

APPLICATIONS are invited for the following posts:

SENIOR DRAUGHTSMAN
WESTERN SUB AREA
Ref.: PER/V/2063/T

Candidates should have had a good general and technical education and be experienced in one or more of the following subjects: building and civil engineering design, engineering drawing, plant layout in substations. In addition the applicant should be capable of supervising Engineering Draughtsmen and/or Junior Draughtsmen, if required.

The post is graded under Schedule D of the National Joint Board Agreement as Grade 5—£672/£777 per annum, inclusive of London Allowance.

ENGINEERING DRAUGHTSMAN
WESTERN SUB AREA
Ref.: PER/V/2064/T

Candidates should have had a good general and technical education and be experienced in drawing office routine, electrical diagrams, mains survey and recording of mains work, and layout of plant in transformer chambers.

ENGINEERING DRAUGHTSMEN
CHIEF ENGINEER'S DEPARTMENT
(DRAWING OFFICE)
Ref.: PER/V/1989/T

Applicants should preferably have served an engineering apprenticeship and have had technical training to Ordinary National Certificate level, together with experience in the layout of transforming plant, H.V. switchgear and cables.

ENGINEERING DRAUGHTSMEN
SOUTHERN SUB-AREA
Ref.: PER/V/2068/T

Candidates should have a good general and technical education up to Ordinary National Certificate standard, be neat and capable draughtsmen and experienced in one or more of the following subjects: drawing office routine, electrical diagrams, lay-out of plant in transformer chambers, mains survey and recording of mains work.

The posts of Engineering Draughtsmen are graded under Schedule D of the National Joint Board Agreement, as Grade 6—£535. 10s. to £661. 10s. per annum, inclusive of London Allowance.

Application forms obtainable from Personnel Officer, 46/7 New Broad St, London, E.C.2, to be returned completed by 19 Nov., 1955. Please enclose addressed envelope and quote appropriate reference number of vacancy preferred, as indicated above.

(V 674)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area, Hemel Hempstead District

FOURTH ASSISTANT ENGINEER
180/55.R.

Candidates should hold the Higher National Certificate or equivalent qualifications and have had experience in the construction, operation, and maintenance of H.V. and L.V. overhead and underground distribution systems, including substations.

Salary—N.J.B. Class E, Grade 11 (£555/£600).

Apply by letter within 14 days to the District Manager, Eastern Electricity Board, 44 Marlowes, Hemel Hempstead, Herts.

Northmet Sub-Area, Wood Green District

THIRD ASSISTANT ENGINEER
181/55.R

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary—N.J.B. Class F, Grade 9 (£675/£720) plus London Allowance.

Apply by letter within 14 days to the District Manager, Eastern Electricity Board, 13/27 Station Rd, Wood Green, London, N.22. (V 727)

CENTRAL ELECTRICITY AUTHORITY
London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service will be in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for posts (*a*) and Corporate Membership for post (*b*) an advantage.

(*b*) EFFICIENCY ENGINEER
DEPTFORD WEST GENERATING STATION
Vacancy No. 55/863

Some operating experience with responsibility through Departmental Superintendents for efficient operation of the Boiler and Turbine Plant. Salary—Class J, Grade 7=£945 per annum.

(*a*) ASSISTANT SHIFT CHARGE ENGINEER
DEPTFORD WEST GENERATING STATION
Vacancy No. 55/864

Sound engineering and technical training with practical experience in operation of a large modern power station. Salary—Class J, Grade 9=£829. 10s. per annum.

(*a*) ASSISTANT ENGINEER (CONTROL)
HACKNEY GENERATING STATION
Vacancy No. 55/865

Applicants will be expected to undertake Control Room duties in the "A" Station Control, with responsibility for synchronising, load control, and the necessary switching operations. Salary—Class H, Grade 12=£666. 15s. per annum.

(*a*) STATION SHIFT CONTROL ENGINEER
ST. PANCRAS GENERATING STATION
Vacancy No. 55/866

Sound technical training, experience of D.C. and operation of H.T. Switchgear. Salary—Class E, Grade 10=£624. 15s. per annum.

(*a*) STATION SHIFT CONTROL ENGINEER
WOOLWICH GENERATING STATION
Vacancy No. 55/867

Applicants should possess good technical qualifications, and have had sound technical training and practical experience in the control and operation of steam generating plant and switchgear. Salary—Class G, Grade 10=£708. 15s. per annum.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, Central Electricity Authority, London Division, P.O. Box 136, Generation House, Great Portland St. W.1, and be received within 14 days of this advertisement. (V 694)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SECTION ENGINEER required in the Oswestry District of the Board's No. 4 Sub-Area. Salary within the range £715/£760 per annum (N.J.B. E/7). Applicants should have experience in design, construction and operation of E.H.T., H.T. and L.T. overhead and underground distribution systems, including indoor and outdoor substation equipment. Technical qualifications desirable.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from The Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham, should be completed and returned as soon as possible.

(V 467)

SOUTH WALES ELECTRICITY BOARD

require FOURTH ASSISTANT ENGINEER, Construction Department, Western Sub-Area (Tenby).

Applicants should have had some experience of Overhead Line Design including profiling and maintenance schedules and supervision of line construction.

Salary—Class G, Grade 13 (£555/£600) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience and three referees, to be addressed to the Secretary (Establishments Section) to arrive by 12 Nov., 1955.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (V 716)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Central Gloucestershire Sub-Area

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER (CHELTENHAM DISTRICT)

Applicants should possess a sound technical training and have a wide practical experience of industrial, commercial and domestic installations and their electrical requirements. The duties include negotiations with consumers, preparation of estimates, etc., planning and supervision of contracting work, advice on utilisation with particular reference to industrial consumers. Experience of appliance repairs would be an advantage. Technical qualifications desirable. Salary £675/£720 per annum (N.J.B. Grade E.8).

ASSISTANT (WAYLEAVE)

Duties include assisting the Senior Assistant in charge of Sub-Area Wayleave Department in obtaining wayleaves, profiling, plotting of routes for mains and all associated matters. Salary £585/£645 per annum (N.J.C. Grade 3).

ASSISTANT WAYLEAVE OFFICER
(CHIPPING SODBURY)

Duties include assistance in simple survey and plotting of routes for proposed overhead lines. Experience desirable. Salary £425/£525 per annum (N.J.C. Grade 1).

Apply in writing, within fourteen days, stating age, experience, present salary and position to Mr S. Raybould, Sub-Area Manager, Midlands Electricity Board, 126 London Rd, Gloucester.

North Staffordshire Sub-Area

FOURTH ASSISTANT ENGINEER
(COMMERCIAL)

The duties will include supervision, sales installation and servicing of commercial and domestic refrigeration. Salary £675/£720 per annum (N.J.B. K.13). The successful applicant would be required to live in or near Stoke-on-Trent.

Apply in writing, within ten days, to Mr H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, 31 Kingsway, Stoke-on-Trent.

Shropshire and Hertfordshire Sub-Area

SENIOR SERVICE CENTRE ASSISTANT (MALE)
(WELLINGTON DISTRICT)

Duties include the supervision of Service Centre and the promotion of sales of electricity and electrical appliances. Experience essential. Salary £585/£605 per annum (N.J.C. Grade 3).

Apply in writing, within fourteen days, stating age, experience, and present position, to District Manager, Midlands Electricity Board, Broadway, Haygate Rd, Wellington, Salop.

A. STEPHENS,
Secretary.
(V 723)

THE NORTH EASTERN ELECTRICITY BOARD
Wear Sub-Area

APPLICATIONS are invited for the following appointments:

FOURTH ASSISTANT ENGINEER, Planning and Development Section, Sub-Area Headquarters. Duties include assistance in preparation of schemes and estimates for extension and reinforcements to overhead and underground H.V. and L.V. networks. Applicants must be qualified electrical engineers. Salary—Schedule A, Class L, Grade 13, £715/£760. N.J.B. conditions of service.

DEMONSTRATOR, South Shields. Applicants should have a certificate of a recognised Domestic Science Training College and/or E.A.W. Certificate, preferably the latter; also considerable experience as a Demonstrator or Assistant Demonstrator in the Electricity Supply Industry. Salary Grade 1—£425/£525. Annual increments of £20 up to £465, beyond £465 increments subject to certificate of competence.

Applications stating age, qualifications and experience, to be received by the Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement.

(V 730)

SURREY EDUCATION COMMITTEE
Kingston Technical College, Fassett Road, Kingston-on-Thames

REQUIRED in Engineering Department, LABORATORY TECHNICIAN for the Electrical Machines, Electrical Science, Advanced Measurement, Materials Testing Laboratories. Duties to include the construction, maintenance and repair of Electrical Machines and Apparatus. Experience in electrical work essential with preference to holders of an Ordinary or Higher National Certificate in Electrical Engineering. Salary Scale £420 x £15—£465 x £20—£485 per annum with London Weighting of £30 per annum for men of 26 or over. National Joint Council conditions of service, including superannuation. Applications should be sent to the Principal as soon as possible. (V 753)

FEDERAL GOVERNMENT OF NIGERIA
Electrical Engineers, Public Works Department

DUTIES, under the supervision of the Senior Electrical Engineer, are the design, supervision and maintenance of electrical installations in Government Buildings, Hospitals, Staff Quarters, etc. The investigation and application of modern forms of electrical wiring to tropical conditions is a particular duty of the appointment.

Appointment is on contract in the salary scale £1,290/£1,956 per annum gross plus a gratuity of £150 per annum payable on satisfactory completion of contract. Free first class passages are provided for the officer and his wife and a refund of cost of children's passages between Nigeria and home country not exceeding the cost of 2 adult passages in any one tour. Children's (Separate Domicile) Allowance of £75 each for a maximum of 2 children up to the age of 18 is payable. Leave is granted at the rate of 7 days for each month of resident service. Government quarters are provided, if available, at low rental.

Candidates, between 28 and 35 years of age, must be A.M.I.E.E. or have passed or be exempt from Sections A and B of the Institution's examination provided they obtain Corporate Membership within three years. An engineering apprenticeship with an electrical installation contractor or a Supply Company is desirable and candidates must have had experience in all classes of electrical installation work, from estimates to completion of large public building oil engine stand-by generating plant. A knowledge of tariffs and power factor correction will be an advantage.

Apply in writing to the Director of Recruitment, Colonial Office, Great Smith St, London, S.W.1, giving briefly age, qualifications and experience. Mention the reference number BCD.112/14/014. (V 746)

WAR OFFICE

VACANCIES exist for mechanical and electrical engineering draughtsmen in the designs branch of the Directorate of Fortifications and Works, War Office, Chessington, Surrey.

MECHANICAL DRAUGHTSMEN — (H and V)—applicants must have knowledge and experience of design of low-pressure hot water heating and domestic hot water supply installations. O.N.C. in Mechanical Engineering or equivalent is essential.

ELECTRICAL ENGINEERING DRAUGHTSMEN—Applicants must have several years' experience in the preparation of schemes for the illumination and electrical equipment of buildings or in electrical distribution H.V. and M.V. O.N.C. in Electrical Engineering or equivalent is essential.

Applicants must be British of British parentage.

Salary range is £453 (at 21)/£710 plus overtime. Starting pay according to age, qualifications and experience, with annual increases subject to satisfactory service. Prospects of promotion and establishment. Canteen facilities.

State age, full details of training and experience to Secretary of State for War, War Office (C.5.D.) R.558 Northumberland House, London, W.C.2. (V 702)

SOUTHERN ELECTRICITY BOARD
ASSISTANT ENGINEER (MAINTENANCE AND OPERATION)

SWINDON DISTRICT of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class F, Grade 11 (£595/£640 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist with the operation and maintenance of H.V. and L.V. distribution mains and substations, and with minor construction work. A technical training to H.N.C. standard and experience of similar work are required.

ASSISTANT ENGINEER (LOCAL)

Swindon District of No. 2 (Newbury) Sub-Area located at Cirencester. Salary N.J.B. Class F, Grade 11, commencing at £595 per annum and rising to £640 per annum maximum. N.J.B. Conditions of Service.

Applicants should have experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

WAYLEAVE OFFICER

Reading District of No. 2 (Newbury) Sub-Area. Salary N.J.C. Grade 2 (£525/£585 per annum), N.J.C. Conditions of Service.

Candidates must have ability to negotiate Wayleave Agreements for the erection or laying of electric lines and installation of Substation Plant.

The successful candidates for the above appointments will be required to contribute to the C.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications for the above posts on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, and returned to him, in envelopes suitably endorsed, not later than 18 Nov., 1955. (V 734)

CENTRAL ELECTRICITY AUTHORITY
South Eastern Division

1. ASSISTANT ENGINEER (WORKS OFFICE CO-ORDINATION)—LITTLEBROOK POWER STATION

THE purpose of this position is to co-ordinate the work of operation, maintenance and other technical services, and includes supervision of staff engaged upon the planning of plant maintenance and the development of new methods of working. The post offers exceptional opportunities to those having experience of maintenance in the engineering industry and of steam power plant operation. This is a new appointment calling for organising ability and the development of fresh ideas. Education up to Higher National Certificate is desirable. Class L, Grade 8, £975/£1,050 per annum plus London Allowance.

2. SECOND ASSISTANT ENGINEERS (MECHANICAL)—CONSTRUCTION DEPARTMENT, KINGSTON

Applicants should preferably be Corporate Members of the Institution of Mechanical Engineers and have had experience in pipework and/or installation of oil storage and refinery plant. Class AX/DX, Grade 2, £950/£1,075/£1,165 per annum, plus London Allowance.

3. GENERAL ASSISTANT ENGINEER (EFFICIENCY)—LITTLEBROOK POWER STATION

Preference will be given to those possessing Ordinary National Certificate and who have experience of power station plant. Class L, Grade 18, £515/£560 per annum plus London Allowance.

4. GENERAL ASSISTANT ENGINEER (CONTROL) BRIGHTON "B" POWER STATION

Applicants should have had experience in the operation and control of turbo-generators and in Control Room duties. Class J, Grade 13, £635/£680 per annum.

N.J.B. Conditions of Service. Written detailed applications should be sent according to location of vacancy to the following:

1 and 3 Station Superintendent, Littlebrook Power Station, Near Dartford, Kent.

2 Establishments Officer, Central Electricity House, Lower Ham Rd, Kingston-on-Thames.

4 Station Superintendent, Brighton Power Station, Portslade-by-Sea, Sussex.

Closing date: 12 Nov. (V 720)

NORTH-WEST KENT COLLEGE OF TECHNOLOGY DARTFORD
DEPARTMENT OF ELECTRICAL ENGINEERING

APPLICATIONS are invited for an appointment as ASSISTANT LECTURER IN ELECTRICAL ENGINEERING (Grade B). The duties of the post (which becomes vacant on 1 Jan., 1956) include teaching general Electrical Engineering subjects up to O.N.C. level and Heavy Electrical Engineering subjects up to H.N.C. level.

Applicants should be graduates in Electrical Engineering and/or Corporate Members of the Institution of Electrical Engineers and should have had industrial experience. Teaching experience would be an added qualification.

Salary in accordance with Burnham Technical Scale (Grade B—£525 x £25—£820) with graduate and other allowances. Industrial and teaching experience is taken into account in fixing the commencing salary.

Further particulars and form of application may be obtained from the Principal, North-West Kent College of Technology, Miskin Rd, Dartford, Kent. (V 707)

SOUTH EASTERN ELECTRICITY BOARD
THIRD ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)—SURREY SUB-AREA HEADQUARTERS, DORKING

SALARY £790/£850 per annum under N.J.B. Grade 10, Class K. Superannuable. Applicants of at least H.N.C. standard should have a sound distribution experience, preferably with emphasis on testing and system protection. Duties will principally be concerned with commissioning of 33 and 11 kV plant and with the commissioning and routine testing of system protection.

Applications, naming two referees, on forms from C. W. Hughes, B.SC., M.I.E.E., Surrey Manager, SEEBoard, Rough Rew, Horsham Rd, Dorking, by 16 Nov., 1955.

CARTOGRAPHIC DRAUGHTSMAN (MALE)—WEST KENT DISTRICT

Salary within the range £190/£495 per annum plus London Weighting, according to age and experience. Superannuable. Applicants should have a sound general education and experience of general drawing office routine.

Applications, naming two referees, on forms from P. S. Watson, M.I.E.E., West Kent District Manager, SEEBoard, 270 High St, Orpington, by 16 Nov., 1955.

JOINTER OR JOINTER (EXTRA HIGH TENSION)—HORSHAM DISTRICT

Wages—Jointer 3s. 11d. per hour; Jointer (E.H.T.) 4s. 1d. per hour for 44-hour, 5-day week under N.J.I.C. Agreement.

Applications, naming two referees, to L. J. Simmons, M.I.E.E., A.M.I.I.A., Horsham District Manager, SEEBoard, 32/40 North St, Horsham, by 16 Nov., 1955.

A. L. BURNELL,
Secretary.
(V 717)

CUMBERLAND EDUCATION COMMITTEE
Workington College of Further Education, Cumberland

Principal: J. Farmery, B.SC.(ENG.), M.I.E.E., M.I.MECH.E., M.I.P.E.

APPLICATIONS are invited for the post of ASSISTANT, GRADE "B," to teach Electrical Engineering and/or Electrical Installation Subjects up to National Certificate or City and Guilds' standard. The salary will be in accordance with the Burnham Technical Scale, viz., £525 x £25 x £20—£820, with appropriate allowances for training and degree or other qualifications. Increments will be allowed for approved industrial experience after the age of 21 years.

The College is within easy reach of the Lake District and serves an expanding industrial area.

Particulars of the post, together with a form of application, may be obtained from the Registrar, Workington College of Further Education, Park Lane, Workington, and completed applications should be returned to the Principal, as soon as possible.

GORDON S. BESSEY,
5 Portland Sq, Director of Education.
Carlisle. (V 719)

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following post:

GENERAL ASSISTANT ENGINEER
LUTON GENERATING STATION

Salary Class E, Grade 13, £475 x £15—£520 per annum.

Duties include operation of A.C. and D.C. plant on shift, and technical assistance on boilers and turbines, and provides experience useful for subsequent promotion.

Applicants should have had training or experience in similar work. Manual Workers in skilled trades with suitable technical training will be considered. Previous experience or knowledge of Generating Station or rotary converting plant and/or technical training to Ordinary National Certificate standard, or its equivalent will be of advantage.

Applications stating age, details of experience and qualifications should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than 12 Nov., 1955.

W. N. C. CLINCH,
Controller.
(V 701)

AIR MINISTRY

require MECHANICAL and ELECTRICAL ENGINEERS in Works Department for design, operation and maintenance of mechanical and electrical services on R.A.F. stations at home and overseas and Civil Aviation stations. Appointments in two grades (*a*) Main Grade, salary scale £1,182/£1,527; (*b*) Assistant Grade, £761/£1,182. Starting pay according to qualifications and experience. Salaries somewhat lower in provinces. Appointments non-pensionable but with long term possibilities. Special allowance up to £1,500 a year, according to location, payable in addition to salary during overseas service. Candidates, normally, must be natural born subjects of natural born British parents and age 25 or over. *Minimum* qualifications and experience for both grades of posts: (1) (*a*) University degree or equivalent diploma in electrical and/or mechanical engineering with at least 2 years' apprenticeship; or (*b*) Graduate or Corporate member of I.E.E. with at least 3 years' apprenticeship; or (*c*) Graduate or Corporate member of I.Mech.E., appreciable electrical engineering experience with at least 3 years' apprenticeship. (2) Have been employed for minimum of three years with well established engineering concern and gained wide experience in both electrical and mechanical engineering practice. Application forms quoting reference D 240/5A from M.L.N.S., Technical and Scientific Register (K), 26 King St, London, S.W.1. (V 703)

ELECTRICAL ENGINEERS
(Distribution)

required by the Central Electricity Board, Malaya, on contract for one tour of three years. Salary scale (including expatriation pay and present temporary allowance) (i) single men £1,197 rising to £2,100 a year, (ii) married men without children £1,407 rising to £2,499 a year, (iii) family men £1,497 rising to £2,730 a year. Commencing salary according to qualifications and experience. Gratuity £200/£280 a year. Opportunity of terminating appointment after one year's service. Free passages. Liberal leave on full salary. Candidates must have had sound training in electrical and mechanical engineering with experience in the operation of medium Electricity Supply Undertakings and possess a competent knowledge of the maintenance of high and low tension overhead and underground A.C. distribution systems and substation plant. They should preferably be Corporate Members or Graduates of the Institution of Electrical Engineers or possess degrees or other qualifications carrying exemption from the Institution's Graduate examination. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2A/40440/EE. (V 745)

AMENDED ADVERTISEMENT

BOROUGH OF ROMFORD

APPOINTMENT OF SENIOR ASSISTANT ELECTRICAL ENGINEER, £750—£1,000 P.A.

APPLICATIONS are invited, from suitably-qualified persons, for the above new appointment in the Borough Engineer and Surveyor's Department. The post is in Grades V—VI of the A.P. and T. Division of the National Salary Scales (£750/£1,000 per annum) and the commencing salary will be fixed within these grades, according to qualifications and experience.

Housing accommodation will be made available if required.

The person appointed will be required to plan and organise a new direct labour section for the maintenance of electric street lighting throughout the Borough and for maintenance of electrical equipment in schools and council properties, and also to prepare schemes including specifications, for new electrical lighting and heating installations, etc.

Particulars and Conditions of the appointment may be obtained on application to the Town Clerk, Town Hall, Romford, by whom completed applications must be received on or before 16 Nov., 1955. (V 711)

INSPECTOR OF WORKS (ELECTRICAL)

required by the Uganda Government, Public Works Department, for one tour of 30/36 months on contract renewable by mutual agreement. Salary (including inducement pay and present temporary allowance of 10%) £1,003 rising to £1,280 a year. Initial salary according to age and experience. Provident Fund. Free passages. Liberal leave on full salary. Candidates, age 30 to 45, must have served a full apprenticeship and must hold City and Guilds Electrician's Extra Certificate Course "C" or O.N.C. in Electrical Engineering. They must have had experience of (*a*) the installation of electrical machinery and equipment and equipment in hospitals, public buildings, industrial premises, etc., and (*b*) the maintenance and operation of electrical machinery, switchgear, protective devices, etc., in industrial premises. They must be conversant with the various electricity safety rules and regulations and be capable of initiating safety systems. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2A/40818/EE. (V 695)

LONDON COUNTY COUNCIL

PADDINGTON TECHNICAL COLLEGE, ASSISTANT GRADE B to teach electrical engineering subjects to Ord. Nat. Cert. level and subjects of the C. and G. Electrical Installation Courses B and C and be responsible for the electrical laboratories of the Engineering Department. Burnham F.E. salary scale £561 x £25—£1,012, individual minimum and maximum commencing salary according to age, qualifications and experience. Application forms from Secretary at College, Saltram Crescent, W.9, returnable by 19 Nov. (1764). (V 672)

PORT OF LONDON AUTHORITY

THE Port of London Authority invite applications for the position of LEADING TECHNICAL ASSISTANT (Electrical) in the Drawing Office of the Authority. The scale of pay is £600 per annum rising, subject to certain conditions, by annual increments of £25 to £725 per annum, with the commencing rate according to qualifications and experience.

Applicants, who must be British Subjects and have obtained the Ordinary National Certificate in Electrical Engineering, should have had experience in the layout of distribution networks and substations, building, wiring and lighting schemes, and also motor and control gear schematic and wiring diagrams.

The successful applicant will be required to join the Authority's contributory superannuation scheme. In certain cases existing pensionable service is transferable.

Application forms may be obtained from the Establishment Officer, Port of London Authority, Trinity Sq, London, E.C.3. (V 671)

CENTRAL ELECTRICITY AUTHORITY
South Western Division

TECHNICAL STAFF VACANCIES

(*a*) FOURTH ASSISTANT ENGINEER, Measurements Section, Technical Dept.
Salary N.J.B. Class AX/CX, Grade 6, £600 x £25—£725/£765.

(*b*) ASSISTANT ENGINEER (Electrical), Hayle Power Station.
Salary N.J.B. Class F, Grade 10, £635/£680.
Superannuation.

Applicants for (*a*) must possess a sound general and Technical education, preferably to Higher National Certificate or Degree level. Experience in the testing of meters and instruments essential.

Preference will be given to Engineers having also some knowledge of High Voltage Insulation testing.

For (*b*) applicants should have previous experience in electrical maintenance at Power Stations on H.V. and L.V. switchgear, motors, remote control and relay protective equipment. Candidates should be in possession of Higher National Certificate in Electrical Engineering.

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 14 Nov., 1955. (V 698)

COLLEGE OF TECHNOLOGY, BIRMINGHAM
Department of Electrical Engineering

APPLICATIONS are invited for the post of SENIOR LECTURER.

Applicants should be Chartered Electrical Engineers with Honours Degree in Electrical Engineering or its equivalent and should have had practical experience in some branch of Electrical Engineering.

Salary will be in accordance with the Burnham (Further Education) Scale for Senior Lecturers (Men) £1,065 x £25—£1,215.

Further particulars and form of application may be obtained from the Registrar, College of Technology, Suffolk St, Birmingham 1, on receipt of stamped addressed foolscap envelope. Completed forms should be returned to him not later than 2 weeks after the appearance of this advertisement.

K. R. PILLING,
Clerk to the Governing Body.
(V 728)

CENTRAL ELECTRICITY AUTHORITY
North West, Merseyside and N. Wales Division

VACANCY NO. E.272/385/T. STATION SHIFT CONTROL ENGINEER, Barrow Generating Station. Salary £555/£600 (D.10).

Vacancy No. E.272/386/T. MAINTENANCE ASSISTANT (Mechanical), Bromborough Generating Station. Salary £675/£720 (H.11).

Vacancy No. E.272/389/T. SHIFT CHARGE ENGINEER, Stockport Generating Station. Salary £755/£800 (F.7).

Vacancy No. E.272/396/T. ASSISTANT SHIFT CHARGE ENGINEER, Connah's Quay Generating Station, near Chester. Salary £715/£760 (G.9).

Vacancy No. E.272/397/T. SHIFT CHARGE ENGINEER (Temporary), Whitehaven Generating Station. Salary £555/£600 (A.7).

Applications to Divisional Secretary, Central Electricity House, 825 Wilmslow Rd, Manchester 20, before 12 Nov. Quote Vacancy No. (V 673)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

APPLICATIONS are invited for the position of STOCKCHECKER in Aberdeen Area. Salary £525 x £20—£585 (N.J.C. Grade 2). Superannuation Scheme applicable. Application Forms, obtainable from me, should be returned by Monday, 14 Nov., 1955.

Applicants should have a detailed knowledge of materials used in the electricity industry and experience of stores administration and accountancy. Supervisory ability is essential.

J. E. WHITTAKER,
Area Manager.
Millburn St,
Aberdeen. (V 685)

CENTRAL ELECTRICITY AUTHORITY
East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

SENIOR ASSISTANT ENGINEER (RESIDENT)
CASTLE DONINGTON POWER STATION

Vacancy No. 184/55/ET

The duties for the above position include general supervision of the erection and commissioning of all mechanical and electrical plant; for example, turbo-alternators and condensing plant, feed heating equipment, boilers, pumps, high pressure steam and feed piping, switchgear, transformers, and cables, coal and ash handling plant and ancillary equipment. Corporate Membership of the Institution of Mechanical Engineers or the Institution of Electrical Engineers would be a recommendation.

Candidates should be experienced in the supervision of such Power Station equipment, and in co-ordinating work on site in close collaboration with the Resident Engineer responsible for civil engineering and building works and with Divisional Headquarters staff.

The salary will be within Schedule C, Class AX/DX, Grade 1 (£1,100/£1,315 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11 Nov., 1955.

SECOND ASSISTANT ENGINEER (MECHANICAL) CONSTRUCTION DEPARTMENT
CASTLE DONINGTON POWER STATION SITE

Vacancy No. 185/55/ET

Applicants should have had a fundamental training in Mechanical Engineering including workshops, together with experience in the manufacture and erection of heavy mechanical plant as installed in a modern Power Station. Experience in the operation and maintenance of H.P. Boiler plant will be an advantage. A University Degree or equivalent qualification in Mechanical Engineering would be a recommendation.

The salary will be within Schedule C, Class AX/DX, Grade 2 (£950/£1,165 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11 Nov., 1955.

PLANT CONTROL ENGINEERS
DRAKELOW POWER STATION

Vacancy No. 188/55/ET

Vacancies exist at this modern Power Station working with advanced steam conditions for Plant Control Engineers.

Duties will consist of taking charge of operating duties concerned with a pair of 60 MW Unit Boilers and Turbines. Applicants should have had Station control room experience also experience with large capacity plant and possess technical qualifications up to at least Ordinary National Certificate standard. Certificated Marine Engineers would be considered.

Salary will be in accordance with Class J, Grade 10 (£755/£800 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11 Nov., 1955.

STATION CHEMIST
NORTH WILFORD POWER STATION

Vacancy No. 182/55/ET

Applicants should preferably hold the B.SC. degree in Chemistry, or be Associates of the Royal Institute of Chemistry, and must have had considerable experience in the chemical and physical testing of coal, oil and water, and in the application of the results of such tests to Power Station Operation.

Salary will be in accordance with Class K, Grade 7 (£975 x £25—£1,050 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11 Nov., 1955.

STATION CHEMIST
STAYTHORPE POWER STATION
NEAR NEWARK, NOTTS

Vacancy No. 194/55/ET

Candidates should be Associates of the Royal Institute of Chemistry or hold an equivalent qualification and must have had previous experience in a position of responsibility in a Power Station Laboratory.

Candidates should be familiar with the analysis of coal, oil and water and with the

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interpretation and application of the analytical results. Experience with the problems arising from high pressure, high temperature operation and with their solution is desirable.

Salary will be in accordance with Class J, Grade 7 (£900 x £25—£975 per annum) of the National Joint Board Agreement. The Station classification is due to be changed to Class K in the near future.

Arrangements can be made to provide a rented house if desired.

Closing date for receipt of applications, 18 Nov., 1955.

BOILER HOUSE SUPERINTENDENT
DERBY POWER STATION

Vacancy No. 193/55/ET

Applicants must have had a thorough mechanical training and wide experience in the efficient operation and maintenance of Boiler House Equipment in large Generating Stations. They must be familiar with the organisation and compilation of technical records and statistical data, and a knowledge of the chemistry of combustion is necessary. Experience of Pulverised Fuel Firing will be an advantage.

Preference will be given to candidates who are Corporate Members of the Institution of Mechanical Engineers or who hold appropriate equivalent qualifications.

Salary will be in accordance with Class F, Grade 6 £790 x £20—£850 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 18 Nov., 1955.

ASSISTANT SHIFT CHARGE ENGINEER
SPONDON POWER STATION

Vacancy No. 191/55/ET

Applicants should possess the Higher National Certificate or its equivalent and have had experience in a responsible position in a modern Generating Station.

The salary will be in accordance with Class H, Grade 9 (£755 x £15—£800 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 18 Nov., 1955.

These appointments will be pensionable within the terms and provisions of the Central Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.

28 Oct., 1955. (V 733)

YORKSHIRE ELECTRICITY BOARD
No. 5 (Wakefield) Sub-Area

SUB-AREA MANAGER

APPLICATIONS are invited for the post of Sub-Area Manager of the No. 5 (Wakefield) Sub-Area.

Applicants should have extensive knowledge of the industry and a wide experience in the organisation of large units of electricity supply.

Salary—N.J.M./S.A.M. Scale 3, £2,300/£2,550 per annum.

Applications, stating age and full details of qualifications and experience, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, Leeds, not later than 25 Nov., 1955.

No. 5 (Wakefield) Sub-Area

THIRD ASSISTANT ENGINEER
(CONSTRUCTION)

Applicants should have had a sound practical training and experience in the Construction, Operation and Maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Experience in 33 kV work and primary substation construction will be of advantage.

Salary—N.J.B. Class K, Grade 10, £790/£20/£850 per annum.

Castleford District

FOURTH ASSISTANT DISTRICT ENGINEER

Applicants should be Graduate Members

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of the Institution of Electrical Engineers, or hold equivalent qualifications and have had experience in the construction, operation and maintenance of E.H.V. and M.V. Overhead and Underground Distribution Systems.

The successful applicant will be required to live in the Castleford District and undertake standby duties.

Salary—N.J.B. Class F, Grade 11, £595/£15/£640 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 17 Nov., 1955.

No. 2 (Huddersfield) Sub-Area

SECOND ASSISTANT ENGINEER
(CONSTRUCTION)

Applicants should be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications and have had experience in programming and supervising construction work for substations, underground and overhead networks up to 66 kV in industrial, urban and rural areas.

Salary—N.J.B. Class K, Grade 7, £975/£25/£1,050 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market St, Huddersfield, not later than 17 Nov., 1955.

No. 3 (Sheffield) Sub-Area

FOREMAN JOINTER (E.H.T.)

Applicants should have had experience in the laying and jointing of all classes of M.V. and E.H.V. cables up to and including 33 kV, and must be capable of organising and supervising cable jointing work on 11 kV feeders and 11 kV and 33 kV substations.

He will also be required to supervise a cable jointing school for the training of all classes of Jointers.

The rate of pay is £645 per annum (Grade I) and the conditions of service are in accordance with Schedule E of the N.J.I.C. Agreement for the Electricity Supply Industry.

Applications, giving details of age, and experience should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than 17 Nov., 1955. (V 732)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Southern Area

THIRD ASSISTANT DISTRICT ENGINEERS
(TWO) (BERWICK DISTRICT)

N.J.B. Grade D9, £595 x £15—£640.

THIRD ASSISTANT DISTRICT ENGINEER
(HAWICK DISTRICT)

N.J.B. Grade B9, £515 x £15—£560.

APPLICANTS should have a sound technical training and experience in operation and maintenance of overhead and underground distribution systems. Technical qualifications desirable. Applications stating age, qualifications and experience should reach the undersigned by 15 Nov., 1955.

G. H. SANKEY,
Area Manager.

P.O. Box No. 2,
High St, Galashiels. (V 687)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SENIOR DEVELOPMENT ASSISTANT required at the Board's No. 1 Sub-Area Headquarters, 24 Hatton Garden, Liverpool 3. Salary within the range £1,295/£1,400 per annum (N.J.B. L/4).

Applicants should have suitable technical qualifications, and have had a wide experience on the commercial side of the Electricity Supply Industry in the development of industrial, commercial and domestic supplies, contracting and consumer service.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from the Manager at the above address. Closing date: 16 Nov., 1955. (V 699)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Clyde Area

FIRST ASSISTANT DISTRICT ENGINEER required for Clydebank District. Salary scale N.J.B. Agreement, Class G, Grade 4, £975/£1,050 per annum. The post is superannuable.

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications and have experience in construction, operation and maintenance of both H.V. and L.V. underground and overhead distribution systems including switchgear.

Applications should be forwarded to the undersigned, South of Scotland Electricity Board, Clyde Area, P.O. Box 15, 206 St. Vincent St, Glasgow, C.2, not later than Wednesday, 9 Nov., 1955.

DANIEL ROSS,
Manager.
24 Oct., 1955. (V 744)

NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE

Principal: D. A. R. Clark, M.SC.(TECH.), M.I.MECH.E.

APPLICATIONS are invited for the post of ASSISTANT GRADE B IN ELECTRICAL ENGINEERING to prepare students for the City and Guilds Electricians Extra Certificate.

Salary: £525 x £25—£820 per annum, with allowances for training and approved industrial experience.

Application forms and further particulars may be obtained from the Registrar, Nottingham and District Technical College, Shakespeare St, Nottingham, to whom completed forms should be returned not later than 18 Nov.

F. STEPHENSON,
Clerk to the Joint Education Committee.
(V 718)

CENTRAL ELECTRICITY AUTHORITY
North Eastern Division

APPLICATIONS are invited for the appointment of ASSISTANT SHIFT CHARGE ENGINEER at Scarborough Power Station.

Applicants should have served a recognised engineering apprenticeship, and should possess technical qualifications. Some experience in electricity generation would be an advantage.

The salary for the appointment (which is superannuable) will be in accordance with the National Joint Board Agreement, Schedule A, Grade 9, Class C (£555/£600 per annum).

Forms of application may be obtained from Divisional Establishments Officer, Central Electricity Authority, North Eastern Division, Carliol House, Newcastle upon Tyne, to whom they should be returned to arrive not later than 16 Nov., 1955. (V 731)

ASSISTANT LECTURER
(Electrical Engineering)

required for the Government of the Northern Region, Nigeria, for two tours of 18 to 24 months or three tours of 10 to 12 months in the first instance. Option of appointment either (*a*) on agreement with prospect of permanency with salary (including expatriation pay) in scale £750 rising to £1,315 a year or (*b*) on contract with salary (including expatriation pay) in scale £807 rising to £1,453 a year plus gratuity at the rate of £100/£150 a year. Commencing salary according to age, qualifications, experience and war service. Outfit allowance £60. Housing accommodation available for officer and family. Free passages for the officer and wife. Assistance towards cost of children's passages or grant up to £150 annually for maintenance in U.K. Candidates should hold H.N.C. in Electrical Engineering or an equivalent qualification and have had previous teaching and industrial experience. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2A/30630/EE.
(V 696)

CENTRAL ELECTRICITY AUTHORITY
South Eastern Division

GENERAL ASSISTANT ENGINEER (Chemist) required at Littlebrook Power Station. Applicants should possess O.N.C. (Chemistry) or equivalent qualifications and possess a sound knowledge of elementary chemistry. N.J.B. conditions of service Class L, Grade 19, £475/£520 per annum plus London Allowance. Written applications should be sent to Station Superintendent, Littlebrook Power Station, Near Dartford, Kent, to arrive by 19 Nov. (V 729)

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following appointment:

ENGINEERING DRAUGHTSMAN
LITTLE BARFORD GENERATING STATION

Salary N.J.B., Schedule D, Grade 6, £510 x £20—£630 per annum.

Applicants should possess a sound general and technical education. Preference will be given to those with experience in mechanical and/or electrical equipment associated with a modern generating station.

Applications stating age, details of qualifications and experience, should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, not later than 12 Nov., 1955.

W. N. C. CLINCH,
Controller.
(V 700)

CENTRAL ELECTRICTY AUTHORITY
South Eastern Division

SENIOR ASSISTANT required in the Personnel Department at Kingston. The primary duties of the successful candidate will be to assist in the selection of staff. Applicants should, therefore, be capable of appraising applications for employment, and should have had experience in interviewing applicants for employment, particularly the assessment of character. A knowledge of the various Agreements for Conditions of Service in the Electricity Supply Industry will be a definite advantage.

N.J.C. Conditions of Service, Grade 6, £795/£870 per annum, plus London Allowance. Detailed written applications should be sent to the Establishments Officer, Central Electricity House, Lower Ham Rd, Kingston-upon-Thames. to arrive by 14 Nov.
(V 721)

CENTRAL ELECTRICITY AUTHORITY
South Wales Division

Vacancy No. 117/55

APPLICATIONS invited for superannuable N.J.B. appointment of STATION SHIFT CONTROL ENGINEER at Uskmouth Power Station, Newport.

Salary: K10, £790 x £20—£850.

H.N.C. and experience in Power Station control room desirable.

Application forms obtainable from Secretary, South Wales Division, Central Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 16 Nov., 1955. (V 712)

CENTRAL ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following post:

ASSISTANT ENGINEER (EFFICIENCY)
SOUTHAMPTON GENERATING STATION
S/13.724

Applicants should have had appropriate experience in a modern generating station, and manufacturing works experience will be an advantage. Candidates should possess H.N.C. or equivalent and preferably possess or be studying for qualifications leading to corporate membership of an appropriate professional institution.

Salary N.J.B. Grade F.9, £675/£720.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 16 Nov. (V 726)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPOINTMENT OF SENIOR DRAUGHTSMAN

SENIOR DRAUGHTSMAN (ELECTRICAL) required in the Engineering Department at the Headquarters of the Board, Electricity House, Love Lane, Liverpool 3. Salary within the range £640/£740 per annum (N.J.B. Schedule D/5).

Applicants should have had experience in the general design and layout of indoor and outdoor substations up to 33 kV, and have obtained a National Certificate in Electrical Engineering.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from the Establishments Officer at the above address. Closing date: 14 Nov., 1955. (V 697)

APPLICATIONS are invited for the permanent staff appointment of SENIOR ASSISTANT ELECTRICAL ENGINEER at the fully integrated iron and steel plant of Richard Thomas and Baldwins Ltd., Scunthorpe.

Duties, which are varied and interesting, will include the detailing of schemes for plant development, supervision of plant construction and general plant maintenance.

Applicants should be suitably trained and have had subsequent experience in heavy plant electrical engineering, and be between 25 and 35 years of age.

Technical education to at least Higher National Certificate in Electrical Engineering required.

Assistance with housing will be given if required.

Replies giving full details of age, experience and qualifications to Labour Officer, Richard Thomas and Baldwins Ltd., P.O. Box No. 7, Redbourn Works, Scunthorpe, Lincs. (V 705)

ALLEN WEST AND CO., LTD., require DRAUGHTSMEN aged 25-40, works trained and experienced in design and layout of control gear for electric traction. Staff pension scheme, five-day week, salary in accordance with age and experience. Applications in writing giving full particulars to the Chief Draughtsman, Allen West and Co., Ltd., Lewes Rd, Brighton. (V 567)

ASSISTANT ENGINEER required for Overhead Line Contracts, Inverness Area. Good Salary plus subsistence if applicable. Apply: B. French Ltd., Pike Mills, Green St, Kidderminster. (V 751)

RESEARCH ENGINEERS

A number of new appointments are to be made in the

Research Department of

D. NAPIER AND SON LTD.,
LONDON

in connection with work on the aeronautical, marine and heavy electrical and mechanical engineering fields, and particularly on research in the following subjects:

EXPERIMENTAL STRESS MEASUREMENTS AND ANALYSIS BEARINGS, LUBRICATION AND WEAR
DYNAMIC SYSTEM ANALOGUES
GEARING
INSTRUMENTATION
SEALS FOR ROTATING SHAFTS
CONTROL SYSTEMS AND SERVO MECHANISM

Salaries of £1,000 per annum and upwards will be paid to suitable engineers with research or development experience and professional qualifications.

Applications should be sent to:

Dept. C.P.S.,
336/7 Strand,W.C.2
quoting Ref. No. 1417A

(V 540p)

A FUTURE WITH FORD

Ford Motor Co., Ltd., of Dagenham, Essex, have now opportunities for power station draughtsman with the right experience. Could you fill one of these vacancies?

1. A SENIOR ELECTRICAL DRAUGHTSMAN, who can prepare drawings for the layout and cabling of Power House Equipment, Substation Layouts, Electrical Networks Schematic Diagrams, etc. Capable of taking off quantities and preparations of specifications.
2. A JUNIOR ELECTRICAL DRAUGHTSMAN who has already some experience of these duties.

These posts are permanent, and if you are one of the men we are seeking a generous non-contributory pension will follow a salary which has been increased according to your merit. Starting salary will be matched to your experience and qualifications. Are you interested? Then write to our Salaried Personnel Department, quoting reference AS/ND/3. (V 609p)

AN ELECTRICAL ENGINEER is required to assist the Chief of Test, Rotating Electrical Machines Division, Brush Electrical Engineering Co., Ltd., Loughborough, Leics. The duties will be concerned with the planning and re-organisation of the test department. Applicants should hold qualifications suitable for corporate membership of the I.E.E., and have experience of machine testing. Knowledge of design and/or electronics advantageous. This is a good opportunity for a man having a flair for organisation and offers excellent prospects of advancement. Salary commensurate with qualifications and experience. Conditions include non-contributory superannuation. Please reply with full details to the Chief Personnel Officer. (V 658)

ASSISTANT MECHANICAL CONTRACTS ENGINEERS required by Consultants in their London Office. Applicants must have had a good mechanical training and experience, preferably with large steam power plants and associated equipment. Duties will consist of the preparation of specifications, estimates and contract documents, and also to assist in the execution of large engineering contracts from the design stage through to the completion of the work at site. Electrical experience will be an advantage. The salary offered will be according to experience and ability, and the post is pensionable.

Applicants must state fully their technical qualifications and full particulars of training and experience to the Personnel Officer, Ewbank and Partners Ltd., 10/11 Grosvenor Place, London, S.W.1, 200 yards Hyde Park Corner, Sloane 0486. (V 748)

DRAUGHTSMEN

THE ENGLISH ELECTRIC CO., LTD., Liverpool Works, have vacancies in their Switchgear Department for Draughtsmen with experience of Switchgear layout and installation. Wiring Diagrams, Sheet Steel Cubicles, Light Fabrications or Electro Mechanical Mechanisms.

Pensionable and Progressive positions with excellent opportunities for promotion are offered for men with initiative.

Housing assistance will be given to selected applicants and travelling expenses will be paid for interview.

Write giving full details of age, qualifications and experience to:

The Employment Officer, The English Electric Co., Ltd., Walton, Liverpool, 10, quoting Ref. No. 140E.

(V 693p)

ASSISTANT STOREKEEPER required by well known London Electrical Contractors. Knowledge of electrical contracting material an advantage. Write in first instance to Barlow and Young Ltd., 55 Catherine Place, Westminster, S.W.1. (V 738)

BRITISH WEST AFRICA. An ELECTRICAL ENGINEER is required by a firm of electrical contractors. Must have experience on preparation of specifications and estimates and supervision of contract work. Remuneration will be between £1,000 and £1,200 per annum, depending on experience. Family allowances, pension fund, free furnished quarters in Africa and free passages. Write, giving full particulars, to—Box No. 4955, Electrical Times. (V 676)

CABLE SUPERVISOR. Sudan Light and Power Co., Ltd., require for service in Khartoum a Foreman Cable Layer and Jointer to fill the post of Cable Supervisor. Wide experience in laying and jointing cables of up to 11 kV and aluminium-sheathed multi-core auxiliary cables essential. Experience with 33 kV aluminium-sheathed gas-filled cables also desirable.

Salary £E.900 to £E.1,100 (£E.1=£1. 0. 6d.) dependent on experience. Free quarters with basic furniture. Generous leave to U.K. with free passages after 12 months' service. A cost of living allowance is paid at present in addition to salary of between £E.130.260 m/ms. and £E.139.620 m/ms. per annum. An outfit allowance of £E.50 is payable on appointment.

Applications giving age, education, qualifications, experience, present appointment, with salary, and names of two referees, to be sent to Secretary, Power and Traction Finance Co., Ltd., Queen's House, Kingsway, London, W.C.2. (V 690)

CHIEF CONTRACTS ENGINEER: A rapidly developing Company manufacturing switchgear and distribution equipment, requires a Chief Contracts Engineer to control the department, and interpret the customer's engineering requirements. Contributory pension scheme in operation. Write giving particulars of experience, age and salary required to—Box No. 4979, Electrical Times. (V 741)

DRAUGHTSMEN. Mechanical, Layout and Piping, Electrical and Tracers.

For Engineering Consultants. Positions are permanent, pensionable, with five-day week. Free lunches. Basic Salary above A.E.S.D. minimum rates, plus profit sharing scheme.

Phone or write, giving details of previous experience, to the Personnel Officer, Ewbank and Partners Ltd., 10/11 Grosvenor Place, London, S.W.1. 200 yards Hyde Park Corner. Sloane 0486. (V 736)

DRAUGHTSMEN. Johnson and Phillips Ltd. have vacancies in their Contract Department for Draughtsmen having experience in Power Station installation work, light construction, cable racking and overhead line work. Applications stating age, training and experience to Manager, Employment Department, Victoria Works, Charlton, London, S.E.7. (V 618)

ELECTRICAL MOTOR DESIGNER required by centrifugal pump manufacturers. Must be experienced in the design and development of medium-sized A.C. and D.C. machines, submersible-type motors, etc. Excellent opportunity for qualified, enthusiastic and practical man to improve established and internationally-known machines, and to introduce new ideas. The post is one of responsibility and salary will be in accordance. Please send full details, including age, qualifications and experience, to the General Manager, James Beresford and Son Ltd., Stork Works, Kitts Green, Birmingham 33. Applicants may be assured that their replies will be treated as fully confidential. (V 704)

ELECTRICAL Contractors London require ESTIMATING / SUPERVISION ENGINEER. Advantage if used to dealing with Shop, Cinema and Commercial Commercial Contracts. Write full particulars, experience and salary required to—Box No. 4983, Electrical Times. (V 752)

ENGINEER IN CHIEF

Applications are invited for the post of Engineer in Chief Brush Electrical Engineering Company Limited, Loughborough, a subsidiary of the Brush Group Limited.

Applications for this appointment, which will be of Director status, should have the necessary experience to enable them to carry full responsibility to the Managing Director for the production design of the company's various products. Engineers possessing the appropriate qualifications, who would like further details of the appointment and conditions of service, which will include participation in a non-contributory pension scheme and assistance with housing expenses, are invited to submit brief details in strict confidence to Mr Miles Beevor, the Chairman, Brush Electrical Engineering Co., Ltd., Duke's Court, 32 Duke St, St. James's, London, S.W.1. (V 631p)

ELECTRICAL SALESMAN required for British West Africa to take charge of a department handling all types of electrical appliances and accessories, radios and refrigerators. Progressive post for the right man. Remuneration between £800 and £900 per annum. Family allowances, pension fund, free-furnished quarters in Africa, and free passages. Write, giving full particulars, to—Box No. 4957, Electrical Times. (V 677)

K) ELECTRICAL DRAUGHTSMAN, for the Works Engineers Department. Applicants should be experienced in Power and Lighting schemes.

Applications, quoting date and prefix letter of advertisement to: Employment Manager, Vickers-Armstrongs (Aircraft) Limited, Weybridge Works, Weybridge, Surrey. (V 750)

ESTIMATOR (JUNIOR) required for industrial electrical contracting work in Wolverhampton area. Previous experience desirable but not essential. Apply giving fullest details to—Box No. 4981, Electrical Times. (V 749)

EXPERIENCED TRANSFORMER DESIGNER required in the Manchester district. Technical qualifications up to University Degree standard. Practical experience should include work on distribution and medium power units. Salary level £1,000 per annum approximately, depending on qualifications. Reasonable assistance will be given to obtain a house. Apply stating age and experience to—Box No. 4925, Electrical Times. (V 597)

DRAUGHTSMEN

M.K. Electric Ltd. require Draughtsmen, preferably with experience in the specialised field of electric wiring accessories. Permanent posts and good salaries are offered with this established and expanding Company. Write in full confidence giving age, qualifications, experience and salary required to:

General Works Manager, M.K. Electric Ltd., Wakefield St., Edmonton, N.18.

(V 599p)

CONTRACT ENGINEER

fully experienced in the making out of specifications and documents for invitations to tender in the field of steam power stations and power station equipment is required for Brussels engineering department of very important Belgian electricity holding company.

Control of French language necessary. Attractive salary and pension scheme.

Applications stating age, family, qualifications, experience, to

ELECTROBEL,
1 Place du Trône,
Brussels (Belgium).

(V 608p)

ENGINEER for Technical Engineering Department. Duties include the preparation of schemes for new thermal and nuclear energy power plants, both industrial and central, and also the technical analysis of existing plants. Candidates will be expected to provide evidence that their technical and practical background is such as will enable them to assess correctly a client's plant requirements and also to determine the suitability of plant offered by a manufacturer. The work involves a considerable knowledge of thermodynamics, fluid flow mechanics, physics and the application of these to power plant problems, for these reasons the possession of a good academic qualification in engineering is desirable. The successful candidate will be centred in London, but will be expected to undertake short visits to plant sites as required.

Applications, giving details of training, qualifications and experience to date, for the above position, should be sent to the Personnel Officer, Ewbank and Partners Ltd., Engineering Consultants, 10/11 Grosvenor Place, London, S.W.1. (V 747)

FLUORESCENT CONTROL GEAR. An opportunity exists within a large electrical engineering organisation for a man experienced in the design and production of fluorescent and discharge lamp control gear. Duties would include the design of high quality control gear and the organisation and control of a production unit for quantity production. Good starting salary and prospects. Please send full details to—Box No. 4977, Electrical Times. (V 735)

FORD MOTOR CO., LTD., of Dagenham, Essex, have a vacancy in their Power Department for a MECHANICAL ENGINEERING DRAUGHTSMAN. He should have experience of High Pressure Boilers, Turbine and ancillary equipment, together with associated H.P. high-temperature steam piping and feed lines. Higher National Certificate essential.

This is a well-paid post with participation in a generous non-contributory pension scheme. Please reply to Salaried Personnel Department, quoting ref. DMT/1. (V 610)

FOREMAN LINESMAN required for Wood Pole Distribution Scheme in Inverness Area. High Rates paid. Good Conditions. Apply by letter to B. French Ltd., Pike Mills, Green St, Kidderminster. (V 739)

ENGLISH ELECTRIC VALVE CO.,

Chelmsford,

require

MICROWAVE ENGINEERS AND PHYSICISTS

for development work on Magnetrons, Travelling Wave Tubes, Klystrons, Image Orthicons and allied devices. Applicants should preferably be Graduates but others with sufficient practical experience will also be considered. Apply to Dept. C.P.S. 336/7, Strand, W.C.2, quoting Ref. 497N. (V 619p)

FOREMAN required for underground cable and overhead line work in South of England or Midlands. Please reply giving details of experience to—Box No. 4959, Electrical Times. (V 679)

GENERAL MANAGER for small electrical manufacturers, N.E. London, group subsidiary. Electrical sheet-metal work, fabrications, assemblies, L.T. distribution, switchboards, switchgear, boxes, trunking, etc. Qualified electrical engineer with commercial and management experience, able to build present labour force of 80 in full employment area, and productive efficiency. £1,500 per annum to commence. Fully detailed applications in confidence to Director. —Box No. 4963, Electrical Times. (V 681)

GRADUATES in Maths, Physics or Engineering are required for research and development work in telecommunications. They will be offered opportunities for advance to senior executive appointments. Pension scheme. Applications which will be treated in the strictest confidence to ATCM, Southern United Telephone Cables Limited, Dagenham Dock, Essex. (V 742)

JOURNEYMAN PLUMBER JOINTERS required. Successful applicants will be required to travel to all parts of the country. London rates of wages and out allowance paid. Write stating age and giving brief details of experience to—Box No. 4965, Electrical Times. (V 682)

LARGE Electrical Manufacturers in Central London area require the services of a STREET LIGHTING ENGINEER, aged about 35. Must be conversant with all aspects of street lighting. This post offers considerable prospects. 5-day week. Pension Scheme. Canteen.—Box No. 4931, Electrical Times. (V 613)

LARGE Electrical Manufacturers in Central London area require the services of a JUNIOR STREET LIGHTING ENGINEER, aged about 28. This post offers considerable prospects to an ambitious young man. Knowledge of estimating and planning. 5-day week. Pension Scheme. Canteen.—Box No. 4933, Electrical Times. (V 614)

MAINTENANCE ENGINEER with thorough knowledge of lift and electrical maintenance for office block. Write giving details of experience and qualifications to Box 6539, Whites, 72/78 Fleet St, London, E.C.4. (V 691)

MIDDLE EAST department of Société Engetra, Brussels, invites applications for a qualified DRAUGHTSMAN conversant with steam power houses and networks. Salary £110 Sterling or equivalent local currency, tax free, house accommodation and heavy furniture. Three months' leave home after two consecutive summers abroad, travelling expenses for himself and family if married.—Box No. 4919, Electrical Times. (V 588)

METER Manufacturers, N.W. London, require SENIOR AND JUNIOR TEST ENGINEERS for progressive posts in their Test Depts. Write stating education, technical training, experience, salary required, to Box "S.N.", c/o J. W. Vickers and Co., Ltd., 7/8 Great Winchester St, E.C.2. (V 589)

METER REPAIRER (Mechanician) required at Kingston "B" Power Station. Applicants should have had experience in the repair and maintenance of electrical and mechanical instruments, i.e. Pyrometers, Resistance Thermometers, Flow-meters, Pressure Gauges, etc. Some knowledge of Electronics and automatic boiler control will be an advantage. N.J.I.C. conditions of service. Rate of pay at present 4s. 5d. per hour for a 44-hour week (5-day). Written applications should be received by the Station Superintendent, Kingston "B" Power Station, Downhall Rd, Kingston upon Thames, not later than 12 Nov. 1955. (V 722)

ELECTRICAL ENGINEERS

IMPERIAL CHEMICAL INDUSTRIES LTD., Alkali Division, Winnington, Northwich, Cheshire, has vacancies for Electrical Engineers for work on design and later on the maintenance of generating plants and distribution networks. Candidates, age 25-35, should possess a good degree in Electrical Engineering and have had sound workshops experience. Pension and profit-sharing scheme. Removal expenses up to £50 for married men. Application forms available from Staff Manager, please quote ref. GES/ELECT. (V 713p)

NORTH MIDLANDS Electrical Contractors have DIRECTORSHIP available to an Electrical Engineer on Administrative side of business. Investment necessary. Full details to—Box No. 4969, Electrical Times. (V 688)

OVERHEAD LINE ENGINEERS, fully experienced in the design of 11 kV and 33 kV lines, with practical field experience, men with office experience only would be considered, required for Scottish Office of electrical engineers. Good salary and prospects, superannuation, removal expenses, if necessary. Apply giving full particulars, age, married or single, and salary required, all in strict confidence to—Box No. 4951, Electrical Times. (V 664)

PLANNING ENGINEER required with knowledge of production of light to medium electro and mechanical products. Please reply stating full particulars of experience, age and salary required to Salford Electrical Instruments Ltd., Times Mill, Heywood, Lancs. (V 710)

PROTECTION ENGINEER (Electrical) required in the O.I Field areas by International Group operating Oil Industry in Persia. Age 30-45 years. Successful applicant would be responsible for testing, commissioning and maintenance of all electrical protective gear associated with power generation and distribution. Power generation includes steam turbines, gas combustion turbines and diesel generators up to 11 kV and supply system comprises overhead transmission and distribution at 66 kV, 11 kV, 3·3 kV and L.V. to domestic, industrial and oil loading installations. Minimum H.N.C. or equivalent with five years' experience with electrical supply company on protective equipment. Salary not less than £192 per month. Appointment would be for two years in first instance. Married accommodation available after six months. Family passages provided. Write for application form to—Box E.T.300, c/o 191 Gresham House, E.C.2. (V 737)

REPRESENTATIVE required with established connection with Electricity Boards, Wholesalers and Contractors, for Hants, Dorset and Wilts. One or two other agencies not objected to. Give full particulars including remuneration expected.—Box No. 4971, Electrical Times. (V 692)

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REPRESENTATIVE required for City of Manchester by large electrical manufacturers. Candidates must be prepared to live in Manchester and should have experience of selling in the electrical industry. Age under 45, salary and commission, car allowance or car provided. This vacancy will be filled by a salesman who is anxious to make a career with the organisation where there are considerable prospects.—Box No. 4975, Electrical Times. (V 714)

SALES DEPARTMENT ASSISTANT for electrical manufacturers N.W. Lancs. Young man completed National Service. Home and export sales correspondence, distribution, stock control, statistics, etc., £600 to commence. Only informative applications to—Box 4961, Electrical Times. (V 680)

SKILLED OVERHEAD LINESMEN required for Wood Pole Distribution Scheme in Inverness Area. Good Pay and Conditions. Apply by letter to B. French Ltd., Pike Mills, Green St, Kidderminster. (V 740)

SURVEYOR required, conversant with Surveying and Profiling of Overhead Line Routes. Good Salary and Subsistence. References required. Apply B. French Ltd., Pike Mills, Kidderminster or 35 Haugh Rd, Inverness. (V 743)

SWITCHGEAR SUPERVISOR. Sudan Light and Power Co., Ltd., require for service in Khartoum a Foreman Electrical Fitter to fill the post of Switchgear Supervisor. Considerable experience in the installation and maintenance of switchgear and control equipment up to 11kV is essential. Salary £E.900 to £E.1,100 (£E.1=£1. 0. 6d). dependent on experience. Free quarters with basic furniture. Generous leave to U.K. with free passages after 12 months' service. A cost of living allowance is paid at present in addition to salary of between £E.130.260 m/ms. and £E.139.620 m/ms. per annum. An outfit allowance of £E.50 is payable on appointment.

Applications giving age, education, qualifications, experience, present appointment with salary and names of two referees to be sent to Secretary, Power and Traction Finance Co., Ltd., Queen's House, Kingsway, London, W.C.2. (V 689)

TECHNICAL DESIGNER AND DESIGNER DRAUGHTSMAN required with knowledge of production of light to medium electro and mechanical products. Please reply stating full particulars experience, age and salary required to Salford Electrical Instruments Ltd., Times Mill, Heywood, Lancs. (V 632)

TECHNICAL SALES REPRESENTATIVES. Manufacturers supplying insulating materials to electrical industry require representatives for Scotland, North-East and South-West England. Apprenticeship or works experience and minimum of Ordinary National Certificate, but higher qualifications and experience an advantage. Outside selling experience not essential. Permanent position with ample scope for advancement. Salary commensurate with age, qualifications and experience. Write giving full personal particulars, qualifications and details of previous positions to—Box No. 4947, Electrical Times. Our staff already notified of this advertisement. (V 662)

TRANSFORMER DRAUGHTSMAN (25-38 years) required with good experience in all types of power transformers up to 5 MVA. Applicants should be capable of working on own initiative with a minimum of supervision. Housing accommodation is available and the company operate a superannuation scheme. Full details including age, experience and salary required to Lindley Thompson Transformer Co., St. Mary's Rd, Slough. (V 596)

WANTED PHYSICIST with degree or H.N.C. for work on magnetic materials. Reply, stating age, qualifications and salary required to Salford Electrical Instruments Ltd., Times Mill, Heywood. (V 709)

TECHNICAL SALES REPRESENTATIVE required by an old established Company situated N. London, engaged in the manufacture of specialised switches and electrical equipment, and which has embarked on a policy of expansion.

Applicants must have a technical training and background sufficient to enable them to intelligently discuss technicalities with customers, an engaging personality and the ability to negotiate at all levels. Previous selling experience and established trade contacts are desirable but not essential if other conditions are fulfilled.

The position offers interesting employment, good prospects and the remuneration will be commensurate with abilities. Applications, which will be treated in the strictest confidence, must provide full details of the applicant's education and history and addressed to General Manager—Box No. 4939, Electrical Times. (V 633)

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ELECTRICAL, MECHANICAL ENGINEER, M.I.E.E., wide experience, desires to represent reputable firm South Coast, and/or S.E. Area.—Box No. 4905, Electrical Times. (V 529)

ENGINEER, A.M.I.E.E., aged 30, power station, and sales and contract experience of distribution equipment. Manufacturer (sales) or consultant in South preferred. Short term engagement considered.—Box No. 4883, Electrical Times. (V 450)

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VACUUM IMPREGNATION PLANT wanted, new or secondhand; must be in good condition. Size with autoclave approximately 15 in. sq. Prefer to see working.—Box No. 4967, Electrical Times. (V 683)

WANTED, for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use—W and H Cooper Ltd., 176 Brady St, Bethnal Green, E.1. (V 1)

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ELECTRICAL ENGINEERS with wide industrial experience will undertake technical investigation and report work in Scotland on behalf of reputable Firms not locally represented. Transport and instruments available. Walkers, 47 Upper Gray St, Edinburgh 9. Phone: 45093. (V 684)

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Turns could easily become bunched during firing processes due to the surface tension of the molten enamel. Bunched windings would cause hotspots, burn-outs and breakdown of inter-turn insulation.

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Cracks or pores in the tube or enamel would allow moisture to penetrate and cause corrosion, changes in resistance value and open circuits.

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If the insulation resistance of the enamel or tube were to drop at high temperatures it would be necessary to impose a limit to the voltage which could be applied. This would reduce the permissible loading of units of high unit value, and increase the size or number of units required for a given duty.

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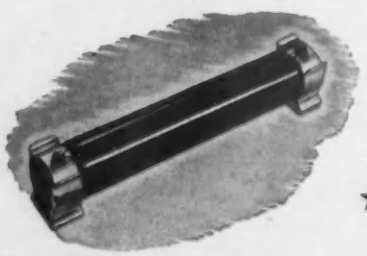
Internal stresses in materials would be revealed as cracks in the surface of the enamel, cracked tubes or open circuits due to mechanical fracture of the fine wires.



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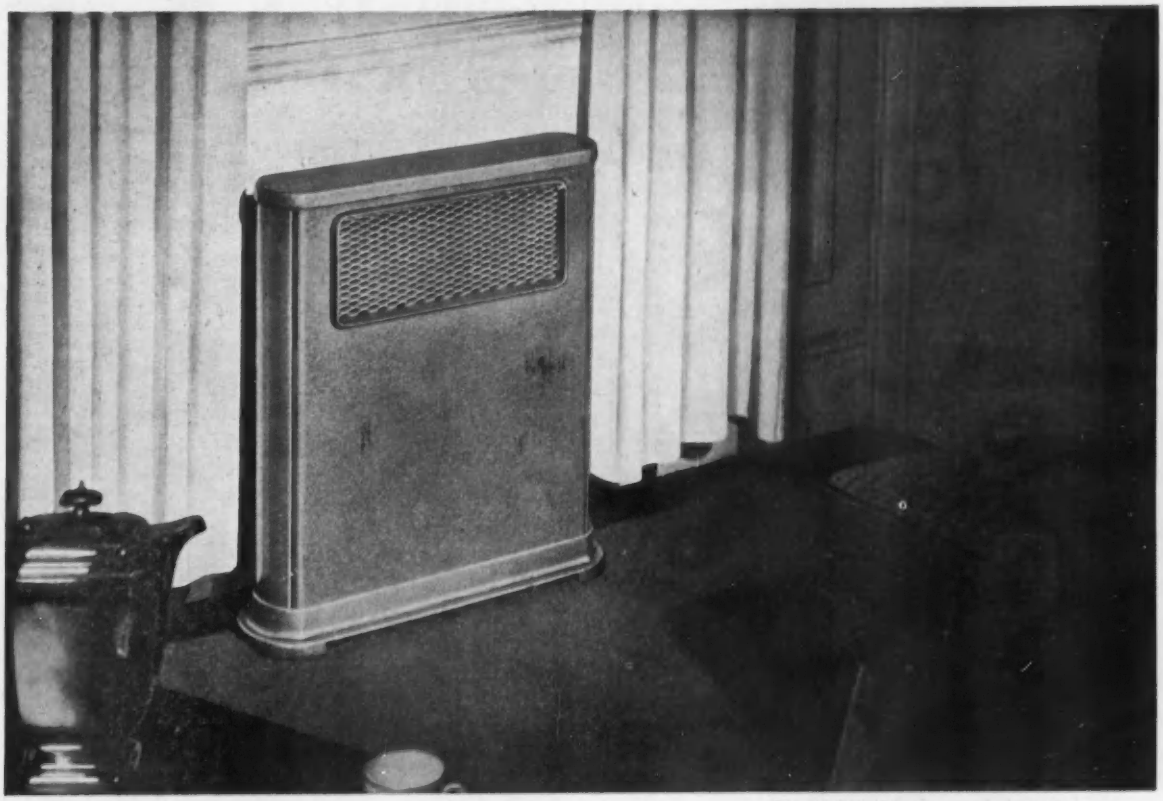

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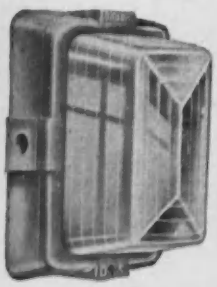

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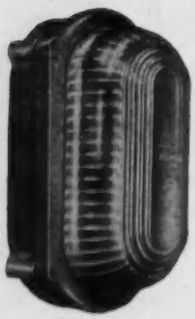

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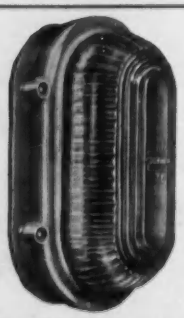

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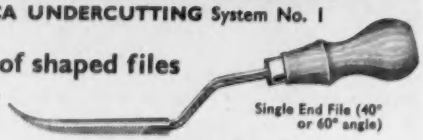

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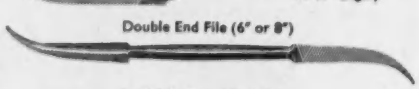

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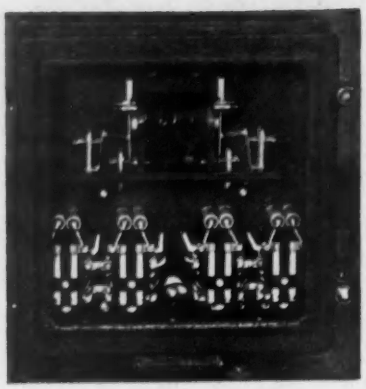
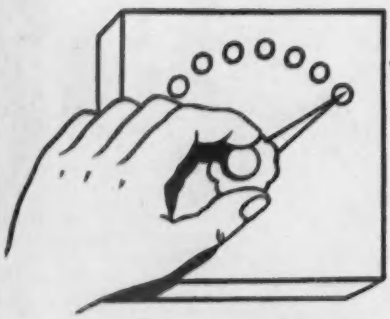


As specialists in the field we shall be pleased to advise on the question of automatic voltage regulation if we may receive particulars of your specific requirements for any loading.



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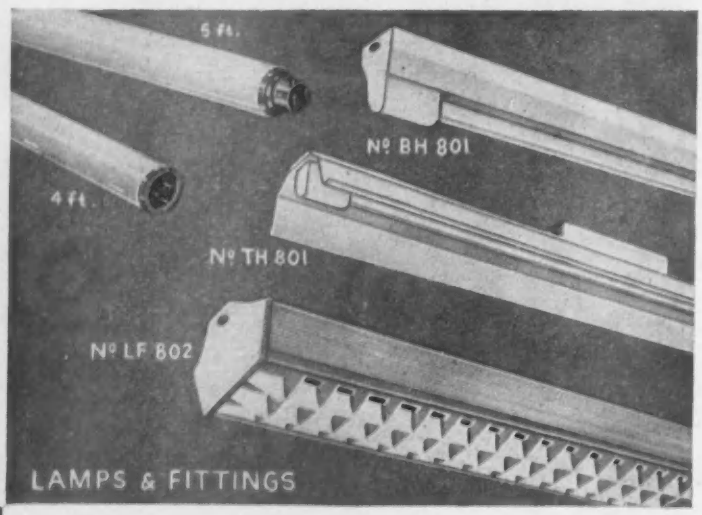

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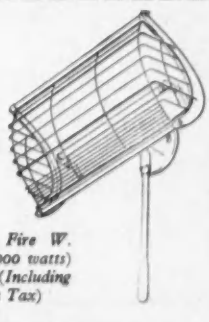
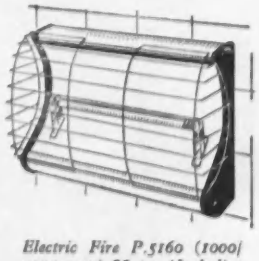
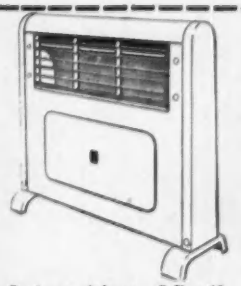


Electric Fire W. 5148 (1000 watts) ***£5.2.5.*** *(Including Purchase Tax)*



Electric Fire P.5160 (1000/2000 watts) ***£6.5.2.*** *(Including Purchase Tax)*



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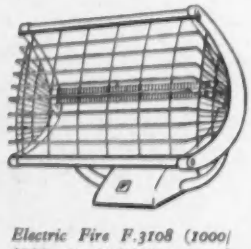

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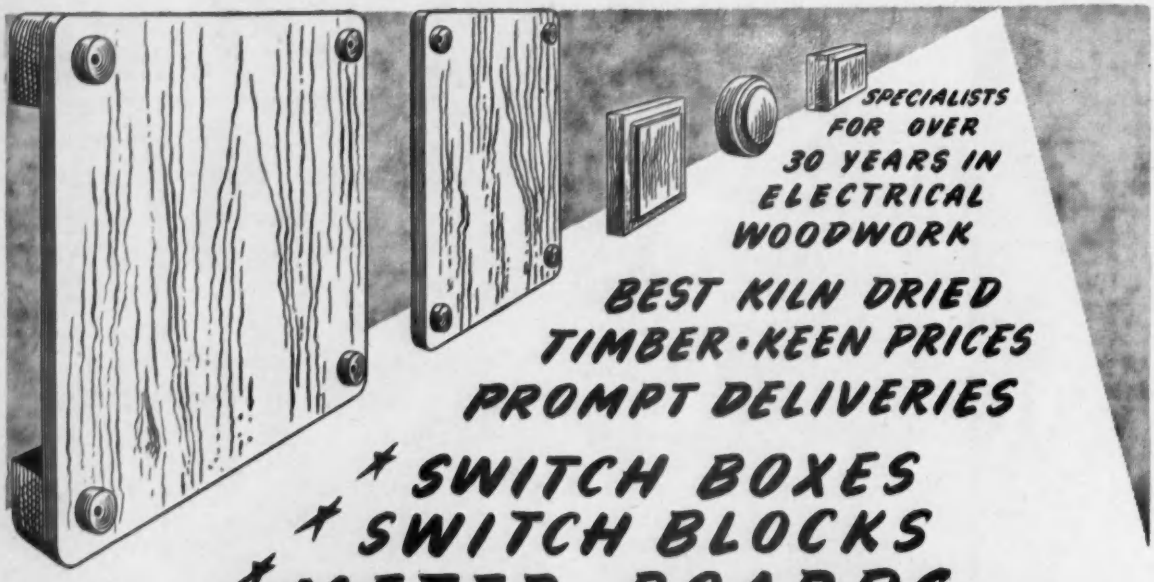

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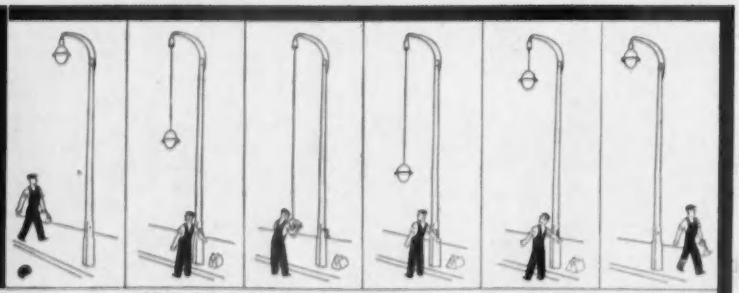

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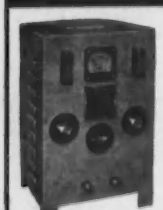

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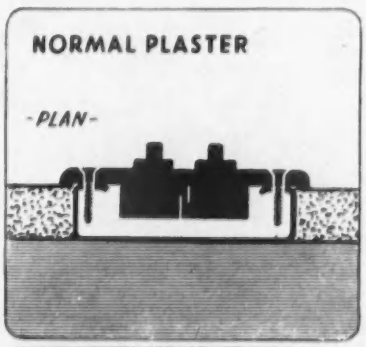

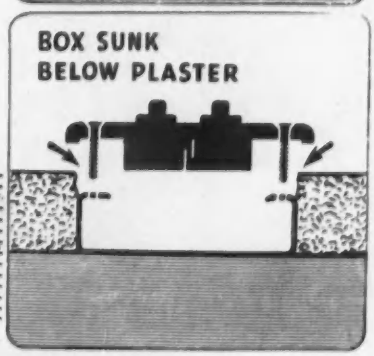

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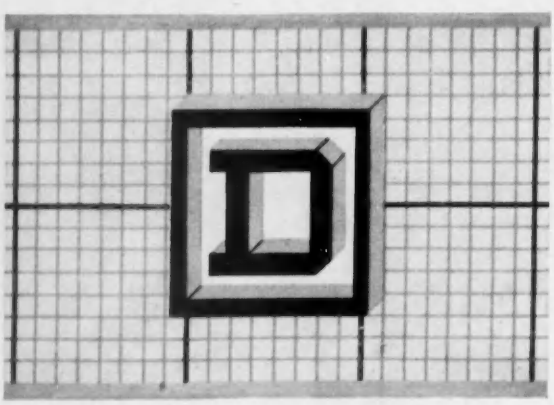

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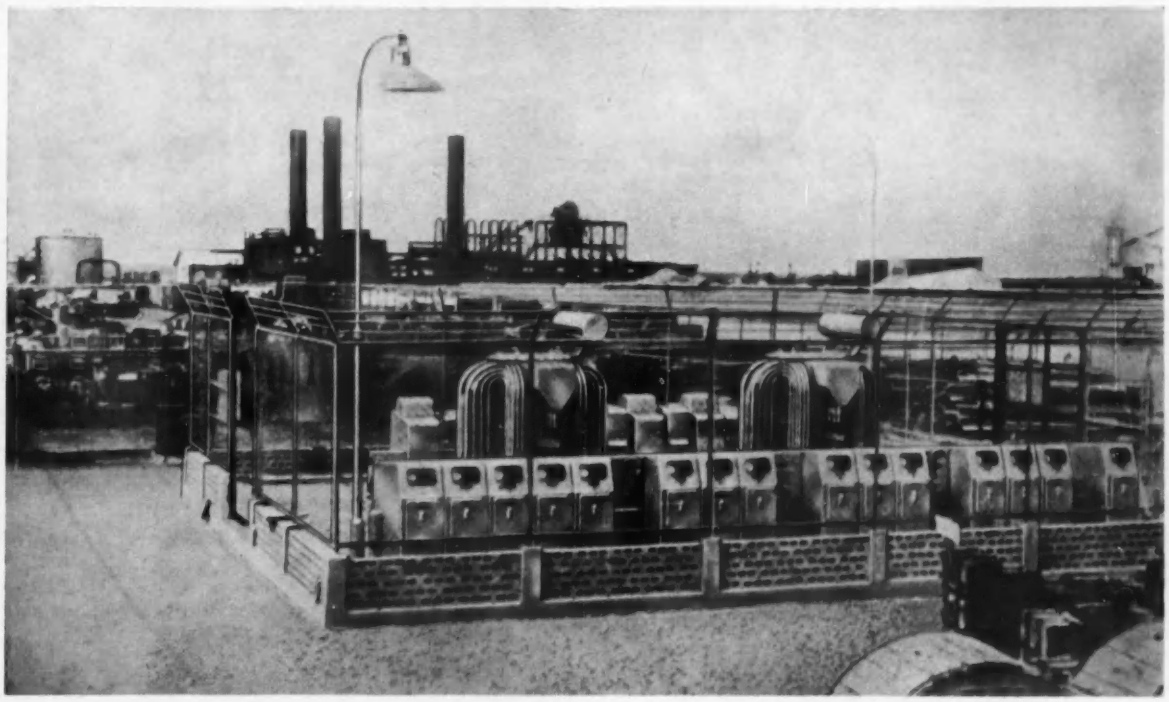

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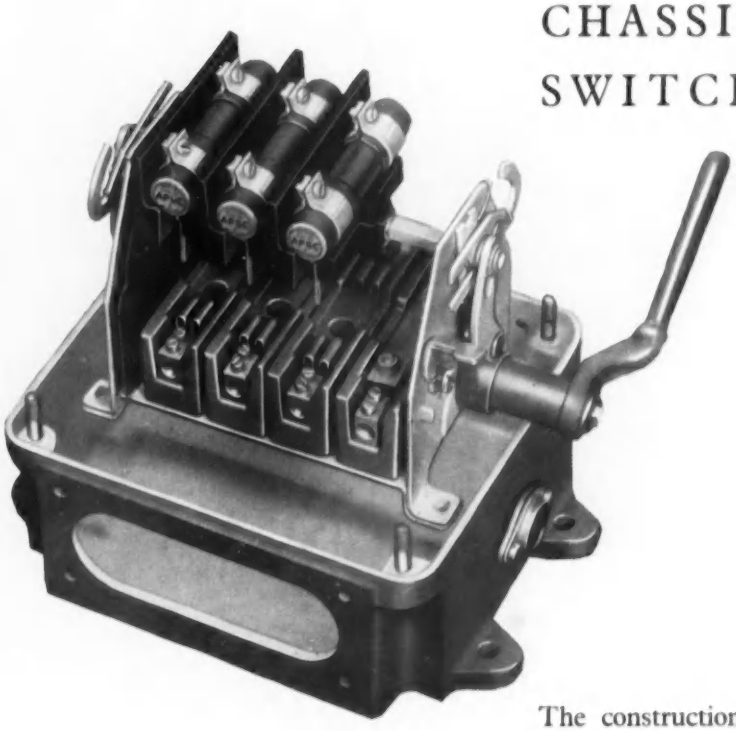

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